FINAL OPERATION AND MAINTENANCE PLAN

COMMERCIAL OIL SERVICES SITE
OREGON, OHIO

ENGINEERING MANAGEMENT, INC.
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April 27, 2001

Ms. Sheila Sullivan
U.S. Environmental Protection Agency
Region V, Waste Management Division
77 W. Jackson Blvd., (HSRM-6J)
Chicago, IL 60604

Re: Final Operation and Maintenance Plan
Commercial Oil Services Site

Dear Ms. Sullivan:

Enclosed for your review and approval is the Final Operation and Maintenance (O&M) Plan for the Commercial Oil Services Site in Oregon, Ohio. The Final O&M Plan has been revised to reflect our past discussions concerning the future O&M activities (documented in our November 16, 2000 letter to you) and the data obtained during the first year of O&M inspections and monitoring. Specifically, the Final O&M Plan includes the following revisions:

- Since the leachate generation has been measured at a low rate, the leachate monitoring requirement has been reduced from monthly to coincide with groundwater monitoring events (quarterly for this year and semi-annually thereafter).

- The annual report originally proposed in the O&M Plan will be replaced by reports after each inspection/monitoring event. Therefore, quarterly reports will be prepared for this year and semi-annual reports will be prepared thereafter.

Groundwater monitoring and Site inspections will be performed as originally proposed. Site figures, Site personnel contact information, and other similar information has been updated. The appendices to the Final O&M Plan, i. e., the Sampling, Analysis and Monitoring Plan, Quality Assurance Project Plan, and Health and Safety Plan, have been revised to be consistent with the Final O&M Plan and are also attached for your review.

Should you have any questions, please do not hesitate to contact me.

Very truly yours,

ENGINEERING MANAGEMENT, INC.

James R. Campbell, Ph.D., P.E.

enclosure

cc: A. Aguwa (Altech, w/o enclosure)
D. Haynam (SLK, w/ enclosure)
T. Huntrods (CRA, w/o enclosure)
A. Van Norman (CRA, w/o enclosure)
COSS Technical Committee (w/ enclosure)

comoil\epa\sulltran.ltr

FINAL OPERATION AND MAINTENANCE PLAN

COMMERCIAL OIL SERVICES SITE
OREGON, OHIO

Prepared By:

APRIL 2001
REF. NO. 5649 (14)
This report is printed on recycled paper.

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1.0 INTRODUCTION

The Final Operation and Maintenance (O&M) Plan for the Commercial Oil Services (COS) Site presented herein, is provided in and forms part of the Final Design Report for the Lagoon Closure Removal Action. This O&M Plan has been prepared by Conestoga-Rovers & Associates (CRA) on behalf of the COS Phase II Group.

This Final O&M Plan has been prepared in accordance with the approved Phase II Removal Action Work Plan (RAWP), prepared by McLaren/Hart Engineers Midwest, Inc., May 14, 1993 (included as Appendix E of the Administrative Order on Consent issued by USEPA on February 17, 1994) and the USEPA approved Final Removal Action Design for Lagoons, dated February 1997, prepared by CRA. The contents of this Final O&M Plan meet the requirements of Chapter 40 of the Code of Federal Regulations (CFR) and Chapter 3745 of the Ohio Administrative Code (OAC).

and serves to finalize ~~update~~ the draft O&M Plan submitted as Att. 4 of Vol. 2 of the RAWP

The Site is located on the southeast corner of Otter Creek and Cedar Point Road, at 3600 Cedar Point Road in Oregon, Ohio. Figure 1.1 presents the location of the Site.

1.1 PURPOSE AND ORGANIZATION OF PLAN

The purpose of this Final O&M Plan is to provide a summary of the post closure operation and maintenance requirements for the Removal Action implemented at the COS Site.

This Final O&M Plan is organized as follows:

- Section 1.0 presents a general introduction to the COS Site and the purpose and organization of the Final O&M Plan;
- Section 2.0 presents a description of the COS Site;
- Section 3.0 presents the Site organizational structure for operation and maintenance;
- Section 4.0 presents the Site operation and maintenance requirements;
- Section 5.0 presents the Quality Assurance requirements for operation and maintenance activities;
- Section 6.0 presents the Health and Safety requirements for operation and maintenance activities;

- Section 7.0 presents the schedule for operation and maintenance activities; and
- Section 8.0 presents a summary of the reports which document in detail the investigations, removal programs and construction programs which have been conducted at the COS Site.

Documentation accompanying the Final O&M Plan, as appendices, includes:

- a Sampling, Analysis and Monitoring Plan (SAMP) (Appendix A);
- a Quality Assurance Project Plan (QAPP) (Appendix B); and
- a Health and Safety Plan (HASP) (Appendix C).

2.0 SITE DESCRIPTION

The COS Site was an inactive waste oil recycling facility. During operations from 1969 to 1985, COS collected, reclaimed and re-refined waste oils, waste sludges, and solvents. The COS Site consisted of seven surface impoundments (lagoons), a tank farm, and a number of tanks, structures and debris scattered throughout the Site. A complete description of the Site can be found in the Final Design Report.

The removal activities conducted at the COS Site prior to implementation of the Final O&M Plan included the following major tasks:

- closure of tanks, lagoons and other areas of the Site which exhibited contamination; and
- construction of an engineered cell that contains solidified/stabilized sludge and other contaminated materials. The cell includes a low permeability compacted TSCA bottom and a RCRA-equivalent cap.

A Site plan showing the proposed remedy is presented on Figure 2.1.

The selected remedy for the COS Site adequately protects human health and the environment, in both the short and long-term, from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the Site by reducing the toxicity, mobility and volume of the contaminants through treatment.

The environmental and hydrogeological setting at the COS Site is well suited for the chosen remedy. The COS Site is located in an extensive area that is zoned and used for industrial purposes and is bordered by Cedar Point Road and an oil refinery to the north, Otter Creek Road to the west, an industrial gas plant to the east, and a closed solid waste landfill and an operating RCRA permitted hazardous waste landfill to the south. Surface water run-off at the Site drains to a drainage swale along the east side of the Site, which flows south to north, and ultimately discharges to Otter Creek, which traverses a major industrial complex before discharging into Lake Erie. The geology of the area consists of a thick (approximately 60 feet), low permeability (approximately 1x10E-8 cm/sec) overburden layer of glacial clay till deposit which acts as an aquitard. For a complete description of the Site geology, see Section 2.4.6.1 of the RAWP.

The O&M activities at the COS Site are designed to be in compliance with post-closure care requirements specified in 40 CFR 265.117 - 265.122, OAC 3745-56-28, and OAC 3745-57-10, and groundwater monitoring requirements specified in 40 CFR 265.90 - 265.109 and OAC 3745-54-91, including, but not limited to:

- monitoring and management of the leachate collection system;
- maintenance of the integrity and effectiveness of the final cover, including making repairs to the cover, as necessary to correct any significant effects of settling, subsidence and erosion;
- maintenance and monitoring of the groundwater monitoring system; and
- prevention of run-on and run-off which may significantly erode or damage the integrity and effectiveness of the final cover.

The O&M activities described herein will be conducted for as long as the contents of the landfill ~~pose a~~ remain a potential risk to public health, safety, welfare, and the environment. O&M activities commenced on January 1, 2000, following completion of the lagoon closure removal action.

2.1 AS-CONSTRUCTED RECORD DRAWINGS

As-Constructed Record Drawings of the containment cell, leachate collection system, groundwater monitoring wells, and final grading of the COS Site are included with the Final Construction Report for the Lagoon Closure Removal Action.

3.0 ORGANIZATIONAL STRUCTURE

The COS Phase II Group holds the management responsibilities for the Site. The implementation of O&M activities at the COS Site is the primary responsibility of the O&M Contractor.

A contact list for O&M activities at the COS Site is included on Table 3.1. The contact list includes the names, addresses, and phone numbers for the O&M Contractor, the COS Phase II Group representative, and the USEPA and Ohio EPA Site contacts.

3.1 OPERATION AND MAINTENANCE CONTRACTOR

The O&M Contractor reports to the COS Phase II Group, and is responsible for the overall management of O&M activities at the COS Site. The O&M Contractor has the overall responsibility to ensure that the Site O&M requirements are completed. The O&M Contractor is responsible for the maintenance of the Site database of monitoring results and inspection reports, and for the timely preparation of the mandatory Site reports to be submitted to the COS Phase II Group, and to the USEPA.

The O&M Contractor duties include, but are not necessarily limited to, the following:

- the overall management of the O&M requirements;
- the preparation of progress reports required by the COS Phase II Group and the USEPA;
- financial accounting for supply and equipment purchases, payroll, and disbursements associated with the O&M requirements of the Site;
- attendance at meetings regarding the Site O&M activities;
- provide liaison at the COS Site with various equipment suppliers, consulting engineers, agency representatives, and contract services companies regarding the O&M activities;
- inspection of the Site components including the Site cover and grounds to ensure that these components are maintained according to the requirements stipulated by the COS Phase II Group; and
- entering the relevant record keeping logs into the Site database.

4.0 OPERATION AND MAINTENANCE ACTIVITIES

The O&M activities at the COS Site are related to leachate monitoring and management, groundwater monitoring, and Site cover and ground conditions.

4.1 LEACHATE MONITORING/MANAGEMENT

The objective of leachate monitoring is to determine the rate of leachate generation and allow the selection of the proper means of disposal. A leachate collection system has been incorporated within the base liner of the landfill in compliance with TSCA Regulations (40 CFR 761.75). This system serves to collect and direct captured leachate to the collection sump, where it will be sampled and removed when sufficient quantity accumulates to necessitate disposal. Installation of the final cell cover has virtually eliminated the introduction of any additional water into the landfill. However, some further dewatering of the waste may take place as the waste material consolidates and small volumes of leachate may be generated from minor weeping from the solidified/stabilized sludge. The generation rate of leachate is very low, less than 50 gallons per month. A detailed description of the leachate collection system is presented in the Final Design Report.

The amount of leachate accumulated in the sump is monitored with a water level indicator. Leachate levels will be recorded concurrent with scheduled Site inspections, i.e., on a quarterly or semiannual basis, as appropriate.

4.1.1 OFF-SITE TREATMENT AND DISPOSAL

Prior to off-Site disposal, leachate will be sampled and analyzed for appropriate waste characterization parameters. These parameters will be determined by the O&M Contractor based on the requirements of the proposed disposal facility. The analytical results will determine appropriate off-Site treatment and disposal requirements. Sampling will be performed in accordance with the sampling protocols presented in the SAMP, included as Appendix A of this Final O&M Plan.

Leachate will be removed through the 5-foot diameter manhole and pumped directly into a transport tanker vehicle. Removal will occur when the sump is approaching capacity. The leachate will be transported to and disposed of at a USEPA-approved disposal or treatment facility, based on waste characterization results.

Details of the pumping equipment controls are contained in Attachment 1 to Appendix A.

4.2 GROUNDWATER MONITORING

The objective of groundwater monitoring is to detect any leakage from the landfill that may affect the underlying groundwater. A groundwater monitoring system consisting of four monitoring wells was installed in the glacial till overburden along the boundaries of the containment cell, as shown on Figure 2.1, will detect any leakage from the landfill. One monitoring well was placed on each side (north, south, east, and west) of the landfill, to ensure that one well will be hydraulically upgradient from the landfill to represent background. Three wells are then downgradient and will monitor any impacts from the landfill. The direction of groundwater flow in the overburden will be determined following measurements of the water elevation in each well. Detailed descriptions of monitoring well installation and construction are presented in the Final Construction Report and in the attached SAMP (Appendix A).

Water levels were measured monthly in each of the four monitoring wells for a one year period. This allowed hydraulic conditions to stabilize following construction. Groundwater quality monitoring will begin in the second year following completion of construction.

Groundwater monitoring will be conducted in accordance with OAC 3745-65-90 et seq. (40 CFR 265.90 et. seq.) as part of Site O&M activities. Each well will be monitored for groundwater quality parameters and parameters serving as indicators of groundwater contamination (OAC 3745-65-92), as follows:

Parameters establishing groundwater quality

Chloride
Iron
Manganese
Phenols
Sodium
Sulfate

Parameters used as indicators of groundwater contamination

pH
Specific Conductance
Total Organic Carbon
Total Organic Halogen

Other

Groundwater Elevation

Sampling for the indicator parameters to establish groundwater quality will be performed quarterly for the first year and annually thereafter. Sampling for the indicator parameters to indicate groundwater contamination will be performed quarterly for the first year and semiannually thereafter. Elevation of the groundwater surface at each monitoring well will be determined during each sampling event.

In addition to the above listed groundwater monitoring, parameters characterizing the suitability of drinking water will be monitored (Appendix III of OAC 3745-65-92, 40 CFR 265.92). Monitoring will consist of quarterly sampling for one year of the following parameters:

Arsenic	Lindane
Barium	Methoxychlor
Cadmium	Endrin
Fluoride	Toxaphene
Lead	2,4-D
Mercury	2,4,5-TP Silvex
Nitrate (as N)	Radium
Selenium	Gross Alpha
Silver	Gross Beta
	Coliform Bacteria

Groundwater sampling will be performed in accordance with the sampling protocols presented in the SAMP, included as Appendix A of this Final O&M Plan. Analytical and Quality Assurance/Quality Control protocols are described in the QAPP, included as Appendix B of this Final O&M Plan.

4.2.1 GROUNDWATER MONITORING CONTINGENCY PLAN

For each indicator parameter listed above, if statistically significant differences in values are found during comparisons for the upgradient and downgradient wells, necessary information will be submitted in accordance with OAC 3745-65-94. Additionally, samples will be taken to confirm previous results and, as necessary, a specific program will be developed as outlined in OAC 3745-65-93 to determine whether hazardous constituents from the landfill have entered the groundwater.

4.3 SITE MAINTENANCE/INSPECTION

The objective of Site maintenance/inspection is to ensure that the integrity of the landfill is maintained and continues to provide protection as designed. The maintenance/inspection activities at the COS Site include the following:

- monthly inspection of the landfill cap for the first year following completion of construction and semiannually thereafter;
- inspection and necessary repair of fencing surrounding the Site;
- biannual mowing and/or fertilizing of the Site grass during the growing season;
- repair damage caused by burrowing wildlife, the presence of deep-rooted weeds, or other foreign vegetation; and
- maintenance items identified by the monthly/semiannual inspection activities.

In the event that differential settlement exceeds acceptable limits or further erosion protection becomes necessary, corrective actions will be undertaken, as necessary. Corrective action plans will be submitted to USEPA for review and approval, as necessary.

A typical Site inspection log sheet is provided on Figure 4.1. The Site was inspected on a monthly basis for the first year following completion of removal action and will be inspected semiannually thereafter. The typical Site maintenance log sheet is shown on Figure 4.2. Any routine maintenance of the Site will be recorded on these logs.

Table 4.1 provides a summary of O&M schedules and tasks and action criteria for each task. A maintenance record of all repairs and corrective actions will be maintained by the O&M Contractor.

4.4 REPORTING

A report summarizing Site O&M activities shall be prepared by the COS Phase II Group and submitted to the USEPA within 60 days after each inspection/monitoring event.

The reports shall document the results of the Site inspections and any necessary maintenance/repair activities. The reports will also provide an evaluation of the leachate generation rate and recommend further leachate handling procedures/schedule modifications, as appropriate.

Groundwater monitoring results will be reported in accordance with OAC 3745-65-94. Any parameters exceeding maximum contaminant levels, as listed in the Appendix to OAC 3745-65-92, will be identified separately. Additionally, each report will cover analysis results for all parameters, groundwater surface elevations, and the required evaluations of the results in accordance with OAC 3745-65-93.

5.0 SITE QUALITY ASSURANCE PROJECT PLAN

A Quality Assurance Project Plan (QAPP) for O&M activities at the Site is presented as Appendix B. The O&M Contractor will modify or supplement the QAPP, as necessary.

6.0 SITE HEALTH AND SAFETY PLAN

The Health and Safety procedures for the O&M activities at the Site are incorporated within the Site Health and Safety Plan (HASP) included as Appendix C.

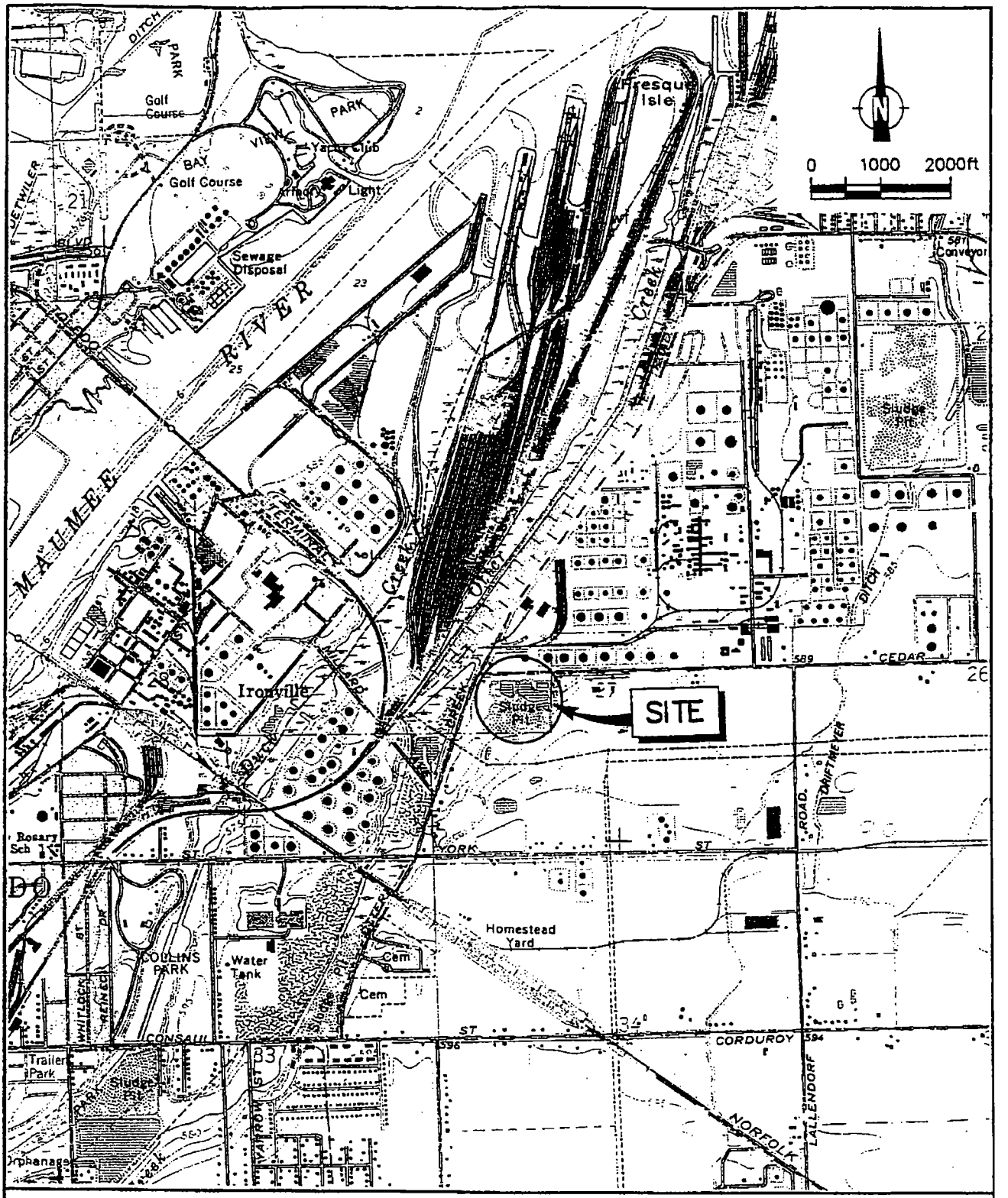
7.0 OPERATION AND MAINTENANCE SCHEDULE

The schedule for O&M activities is presented in Table 4.1, Summary of Operation and Maintenance Schedules and Tasks.

8.0 REFERENCE REPORTS

Previous investigations, designs, work plans, and removal activities which have been conducted at the Site are presented in various reports. A copy of the reports are maintained by the COS Phase II Group. Table 8.1 summarizes the referenced reports.

~~and~~ U.S. EPA, ~~and~~ Ohio EPA in its Admin Record located on the Region 5 office and The site Repository (Regional Pub. Lib.)



SOURCE: USGS QUADRANGLE MAP
OREGON, OHIO

CRA

figure 1.1
SITE LOCATION
COMMERCIAL OIL SERVICES SITE
Oregon, Ohio

5649 (5) MAR 05/94 (W) REV. 0

CEDAR POINT RD.

CONC. WALK

GATE

GATE

GATE

78" HDPE CULVERT

MW-1

MW-2

MW-3

MW-4

MH

FINAL LANDFILL FOOTPRINT

LEGEND

● MONITORING WELL LOCATION

N

0 50 100ft

CRA

05649-37(014)GN-SP004 APR 26/2001

figure 2.1
LEACHATE SUMP AND
MONITORING WELL LOCATIONS
COMMERCIAL OIL SERVICES SITE
Oregon, Ohio

FIGURE 4.1

ON-SITE INSPECTION CHECKLIST FOR THE COMMERCIAL OIL SERVICES SUPERFUND SITE

Date of Inspection: _____

Time of Inspection: _____ Inspection Personnel: _____

Observed Weather Conditions: _____

CAP AND CAP AREA INSPECTION

Evidence Of Subsidence or Settling: _____

Evidence of Burrowing Animals: _____

Presence and Location of Erosion Rills: _____

Seepage Areas on Cap: _____

Damage of Vegetation/Vegetation Height: _____

Presence of Woody Plants: _____

Drainage System Flow Problems: _____

Drainage System Function: _____

Observable Irregularities Such as Bulges, Bumps, Slumps or Cracks: _____

ADDITIONAL COMMENTS: _____

FIGURE 4.1

ON-SITE INSPECTION CHECKLIST
FOR THE
COMMERCIAL OIL SERVICES SUPERFUND SITE

SECURITY FENCE AND ACCESS ROAD INSPECTION

Condition of Fence/Gates/Locks/Chains: _____

Condition of Warning Signs: _____

Evidence of Unauthorized Access/Foreign Objects On Site: _____

Evidence of Burrowing Animals: _____

Condition of Access Roads: _____

ADDITIONAL COMMENTS: _____

DRAINAGE SYSTEM

Evidence of Subsidence/Settling of Backfill Material: _____

Evidence of Overflow, Rerouting or Obstruction of Drainage: _____

ADDITIONAL COMMENTS: _____

LEACHATE COLLECTION SYSTEM

Distance to Surface of Leachate in Sump: _____ Ft.
Depth of Leachate: 42.5 - Dist. to Leachate = _____ Ft.
Volume of Leachate: 146.75 * Depth of Leachate = _____ Gallons
ADDITIONAL COMMENTS: _____

FIGURE 4.1

ON-SITE INSPECTION CHECKLIST
FOR THE
COMMERCIAL OIL SERVICES SUPERFUND SITE

GROUND WATER MONITORING

Depth to Groundwater:

MW1 _____
MW2 _____
MW3 _____
MW4 _____

ADDITIONAL COMMENTS: _____

PHOTOGRAPHS

1	13
2	14
3	15
4	16
5	17
6	18
7	19
8	20
9	21
10	22
11	23
12	24

FIGURE 4.2

ON-SITE MAINTENANCE REPORT
FOR THE
COMMERCIAL OIL SERVICES SUPERFUND SITE

Date of Maintenance: _____

Time of Maintenance: _____ Maintenance Personnel: _____

Observed Weather Conditions: _____

ROUTINE MAINTENANCE OF CAPPED AREA

Evidence of Burrowing Animals (Yes/No)? _____

Action Taken to Remove Burrowing Animals: _____

Repair of Animal Burrows: _____

Actions Taken to Stabilize Erosion Rills/Settled Areas, If Present: _____

Addition of Soil Material Necessary (Yes/No)? _____

If Yes, Was the Area Recompacted, Reseeded, Fertilized and Mulched (Yes/No)? _____

ADDITIONAL COMMENTS: _____

FIGURE 4.2

ON-SITE MAINTENANCE REPORT
FOR THE
COMMERCIAL OIL SERVICES SUPERFUND SITE

VEGETATION

Reseeding Necessary (Yes/No)? _____

Fertilizer Application Necessary (Yes/No)? _____

Type of Fertilizer Applied: _____

Additional Mulching Necessary (Yes/No)? _____

Mowing/Destroy Woody Plants: _____

ADDITIONAL COMMENTS: _____

SECURITY FENCE AND ACCESS ROADS

Actions Taken to Repair Gaps in Fence and Other Fence Maintenance: _____

Actions Taken to Repair Locks, Chains, Signs and Other Items: _____

Actions Taken to Repair Access Roads: _____

ADDITIONAL COMMENTS: _____

FIGURE 4.2

ON-SITE MAINTENANCE REPORT
FOR THE
COMMERCIAL OIL SERVICES SUPERFUND SITE

DRAINAGE SYSTEM

Actions Taken to Restore Proper Drainage: _____

Actions Taken to Repair Discharge/Outlet Pipes: _____

ADDITIONAL COMMENTS: _____

LEACHATE COLLECTION SYSTEM

Depth of Leachate in Sump: _____

Actions Taken to Remove and Treat Leachate: _____

ADDITIONAL COMMENTS: _____

FIGURE 4.2

ON-SITE MAINTENANCE REPORT
FOR THE
COMMERCIAL OIL SERVICES SUPERFUND SITE

PHOTOGRAPHS DOCUMENTING MAINTENANCE COMPLETION

1	13
2	14
3	15
4	16
5	17
6	18
7	19
8	20
9	21
10	22
11	23
12	24

TABLE 3.1

EMERGENCY TELEPHONE NUMBERS
COMMERCIAL OIL SERVICES SITE
OREGON, OHIO

Agency/Organization	*Telephone Number*
St. Charles Hospital	419-698-7200 **or 911**
Ambulance	419-691-5787 **or 911**
Local Police	419-691-5787 **or 911**
Local Fire	419-691-5787 **or 911**
USEPA - Emergency Response	800-424-8802
ChemTrec - Spill Response	800-424-9300
National Response Center	800-424-8802
Underground Utility Locator	800-647-7344
USEPA OSC - Sheila Sullivan	312-886-5251
Ohio EPA RPM - Ron Nabors	419-373-3147
Engineering Management, Inc. - James Campbell	412-244-0917
Conestoga-Rovers & Associates, Inc. - Alan Van Norman	519-884-0510

TABLE 4.1

SUMMARY OF OPERATION AND MAINTENANCE
SCHEDULE AND TASKS
COMMERCIAL OIL SERVICES SITE
OREGON, OHIO

Task	*Frequency*	*Action Criteria*
Groundwater Sampling - groundwater quality	Quarterly (1)	- N/A
- contamination indicators	Quarterly (2)	- a significant increase in an indication parameter, or a pH decrease
- drinking water suitability	Quarterly (3)	- any drinking water parameter exceeding maximum contaminant levels, as listed in the appendix to OAC 3745-65-92
Groundwater Surface Elevation Recording	Monthly (4)	- N/A
Leachate Depth/Volume Recording	Monthly (5)	- N/A
Leachate Removal	When sump Approaches Capacity	- depth greater than or equal to 10.0 feet
Leachate Sampling for Waste Characterization	Prior to Removal	- N/A
Site Inspection	Monthly (6)	- excessive differential settlement - erosion/cracking of cap - ponding of water - holes in fencing - warning signs down - burrowing wildlife/deep-rooted vegetation - condition of vegetation
Grass Cutting	Twice Annually	- during growing season when grass height is at least 12 inches
Reporting	Per Event (7)	- N/A

Notes:
(1) Quarterly for the year 2000 and annually thereafter (only if recoverable groundwater is present).
(2) Quarterly for the year 2000 and semi-annually thereafter (only if recoverable groundwater is present).
(3) Quarterly for the year 2000 only (only if recoverable groundwater is present).
(4) Monthly for the year 2000 and at each sampling event thereafter.
(5) Monthly for the year 2000 and at each sampling event thereafter.
(6) Monthly for the year 2000 and semi-annually thereafter.
(7) Report to be submitted within 60 days following each inspection/monitoring event.

TABLE 8.1

SUMMARY OF REFERENCE REPORTS
COMMERCIAL OIL SERVICES SITE
OREGON, OHIO

Description	*Author*	*Date*
Project Summary of Drum Removal Activities	Hart Engineers	Feb-88
Lagoon Sludge Sampling Plan	Hart Engineers	Dec-88
Supplemental Sampling Plan	Hart Engineers	Dec-88
Engineering Evaluation/Cost Analysis	Hart Engineers	Apr-90
Engineering Evaluation/Cost Analysis, Volume 2-Appendices	Hart Engineers	Apr-90
Treatability Study Work Plan	McLaren/Hart	Jul-91
Proposed Removal Action Plan, Technical Comments	McLaren/Hart	Oct-91
Solidification/Stabilization Treatability Study	McLaren/Hart	May-92
Site Safety and Health Plan	McLaren/Hart	Sep-92
Phase II Removal Action Work Plan	McLaren/Hart	May-93
Administrative Order By Consent	USEPA	
Action Memorandum	USEPA Region V	Nov-92
Health and Safety Plan	CRA	Mar-94
Final Removal Action Design for Tanks and Structures	CRA	Jul-94
Health and Safety Plan, Removal of Tanks and Structures	CRA	Jan-95
Preliminary Removal Action Design for Lagoons	CRA	Mar-96
Final Report, Removal of Tanks and Structures	CRA	Dec-95
Risk Based Remediation Goals Assessment	CRA	10/9/96
Final Design for Lagoon Closure Removal Action	CRA	2/19/97
Final Construction Report for Lagoon Closure Removal Action Contains HASP, QAPP O+M	CRA	1/19/00

APPENDIX A

SAMPLING, ANALYSIS AND MONITORING PLAN

SAMPLING, ANALYSIS AND MONITORING PLAN

FINAL OPERATION AND MAINTENANCE PLAN
LAGOON CLOSURE REMOVAL ACTION
COMMERCIAL OIL SERVICES SITE
OREGON, OHIO

Prepared By:

APRIL 2001
REF. NO. 5649 (18)
This report is printed on recycled paper.

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1.0 INTRODUCTION

This Sampling, Analysis and Monitoring Plan (SAMP) has been prepared by Conestoga-Rovers & Associates (CRA) on behalf of the Commercial Oil Services (COS) Phase II Group as part of the Operation and Maintenance (O&M) Plan for the COS Site (Site) located in Oregon, Ohio. The Site location is presented on Figure 1.1. This SAMP has been developed to provide Site leachate waste characterization data that can be used for leachate waste treatment/disposal purposes and for groundwater characterization data to monitor potential impacts on the groundwater from the containment cell.

The SAMP presents sampling and analytical protocols to be implemented by the O&M Contractor during the O&M sampling events, and to ensure that all data collection activities are conducted and documented in accordance with USEPA and Ohio EPA requirements.

A Site-Specific Quality Assurance Project Plan (QAPP), which describes the specific Post Closure Quality Assurance (QA) and Quality Control (QC) activities designed to achieve the specific data quality goals for the Site, and a Site-specific Health and Safety Plan (HASP), which will be implemented during all O&M activities, have been prepared and are included as Appendices B and C of the O&M Plan, respectively.

2.2.1 MONITORING WELL DESCRIPTION

In accordance with the Final Design Report for the Site, each monitoring well was installed to two feet below the contact between the "weathered" and "unweathered or fresh" clay zones, to the extent that these zones were determined in the field.

Monitoring wells were constructed of 2-inch inside diameter (ID), schedule 40, flush threaded PVC pipe. A ten-foot PVC well screen was attached to the well pipe. The screen slot size will be 0.010 inches. It was intended to place the well screen across the water table with a minimum of two feet of well screen above the water table surface. The PVC well pipe extends approximately two feet above the ground surface. A silica sand filter pack was placed around and a minimum of two feet above the well screen. A two foot bentonite seal was placed above the sand pack. The remaining annulus was tremie grouted to within two feet of ground surface with a neat bentonite cement. A six inch lockable steel casing with a cement collar completed the well installation. A typical well construction schematic is presented on Figure 2.2. The well construction records for the monitoring wells are included in Attachment A to this report.

2.2.2 WELL DEVELOPMENT

After installation, the monitoring wells could not be developed as no groundwater was encountered. Well development will be completed prior to any O&M sampling.

2.2.3 GROUNDWATER QUALITY SAMPLING

Each well will be monitored for the Ohio Administrative Code (OAC) groundwater parameters listed below:

Parameters Establishing Groundwater Quality

Chloride
Iron
Manganese
Phenols
Sodium
Sulfate

Sampling and analyses for each of these parameters will be performed quarterly for the first year of groundwater monitoring and annually thereafter.

2.3 SCHEDULE

Sampling and analysis activities will begin in March 2001 with the first quarterly monitoring event. An O&M Sampling Schedule is presented as Table 2.1.

3.0 GENERAL PROTOCOLS

3.1 EQUIPMENT CLEANING

3.1.1 SAMPLING EQUIPMENT

Precleaned stainless steel or disposable Teflon bailers attached to new nylon rope will be used for collecting leachate samples. Stainless steel bailers will be cleaned using brushes and Alconox (or equivalent) detergent wash water.

Groundwater samples from monitoring wells will be collected using a low flow peristaltic pump. Each monitoring well will be supplied with dedicated Teflon tubing which will stay in place in the wells. The use of dedicated Teflon tubing precludes the need for any decontamination.

Electric water level tapes will be cleaned prior to use at each monitoring well location or leachate collection sump by rinsing with deionized water. Wash waters, rinse waters and purge water will be collected and disposed of as discussed in Section 7.0.

3.2 SAMPLE LABELING

Each sample will be labeled with a unique sample number that will facilitate tracking and cross-referencing of sample information. The sample numbering system to be used is described as follows:

Example: GW-5649-970330-JR-001

GW	-	designates types of sample (GW - Groundwater, L- Leachate)
5649	-	Project Number
970330	-	designates date of collection presented as year/month/day
JR	-	sampler's initials
001	-	sequential number starting with 001 at the start of the project

Quality control (QC) samples will be numbered with a unique sample number, consistent with the numbering system described above, to avoid laboratory bias.

4.0 SAMPLING PROTOCOLS

4.1 GENERAL

A new pair of disposable latex gloves will be used for each sample handled. Disposable gloves will be collected and disposed of as discussed in Section 7.0.

4.2 LEACHATE SAMPLING

Leachate samples from the leachate collection sump will be collected using the following sampling protocols:

i) the depth of water in the leachate collection sump will be measured to the nearest 0.01 foot using an electric tape. The measuring device will be cleaned prior to use using deionized water; and

ii) leachate samples will be collected using a pre-cleaned, Teflon or stainless steel bottom-filling bailer attached to nylon rope. The bailer will be emptied directly into the appropriate sample containers, where containers will be filled in order of decreasing analyte volatility, using techniques which will minimize sample agitation.

4.3 GROUNDWATER SAMPLING

Groundwater samples from monitoring wells will be collected using the following sampling protocols:

i) the depth of water in each monitoring well will be measured to the nearest 0.01 foot using an electric tape. The measuring device will be cleaned prior to use in each monitoring well using deionized water;

ii) prior to sampling, each monitoring well will be purged using a low flow peristaltic pump. The monitoring wells will be purged by removing a minimum of three standing well volumes of water where the volume of standing water is calculated as follows:

$V = 0.041\ d^2\ h$

where:

the samples collected for matrix spike and laboratory duplicate analysis, if required.

Two seals comprised of the O&M Contractor's chain-of-custody tape will be placed over the lid on the front and back of each shipping cooler prior to shipment to secure the lid and provide evidence that the samples have not been tampered with en route to the laboratory. Clear tape will be placed over the seals to ensure that they are not accidentally broken during shipment.

Upon receipt of the cooler at the laboratory, the cooler will be inspected by the designated sample custodian. The condition of the cooler and seal will be noted on the chain-of-custody form by the sample custodian. The sample custodian will document the date and time of receipt of the cooler and sign the chain-of-custody form.

The sample custodian then will check the contents of the cooler with those samples listed on the chain-of-custody form. If damage or discrepancies are noticed, they will be recorded in the remarks column of the chain-of-custody form along with the temperature of the cooler, dated and signed. They will be reported to the laboratory supervisor who will inform the laboratory manager and Quality Assurance Officer (QAO).

Sample disposal will be the responsibility of the laboratory. Upon disposal, the laboratory shall sign the next open "Relinquished by" box, and the word "Disposed" shall be written in the "Received by" box.

regarding the appropriate corrective action. The corrective action may include re-sampling, re-analysis or data qualification.

8.0 HEALTH AND SAFETY PLAN

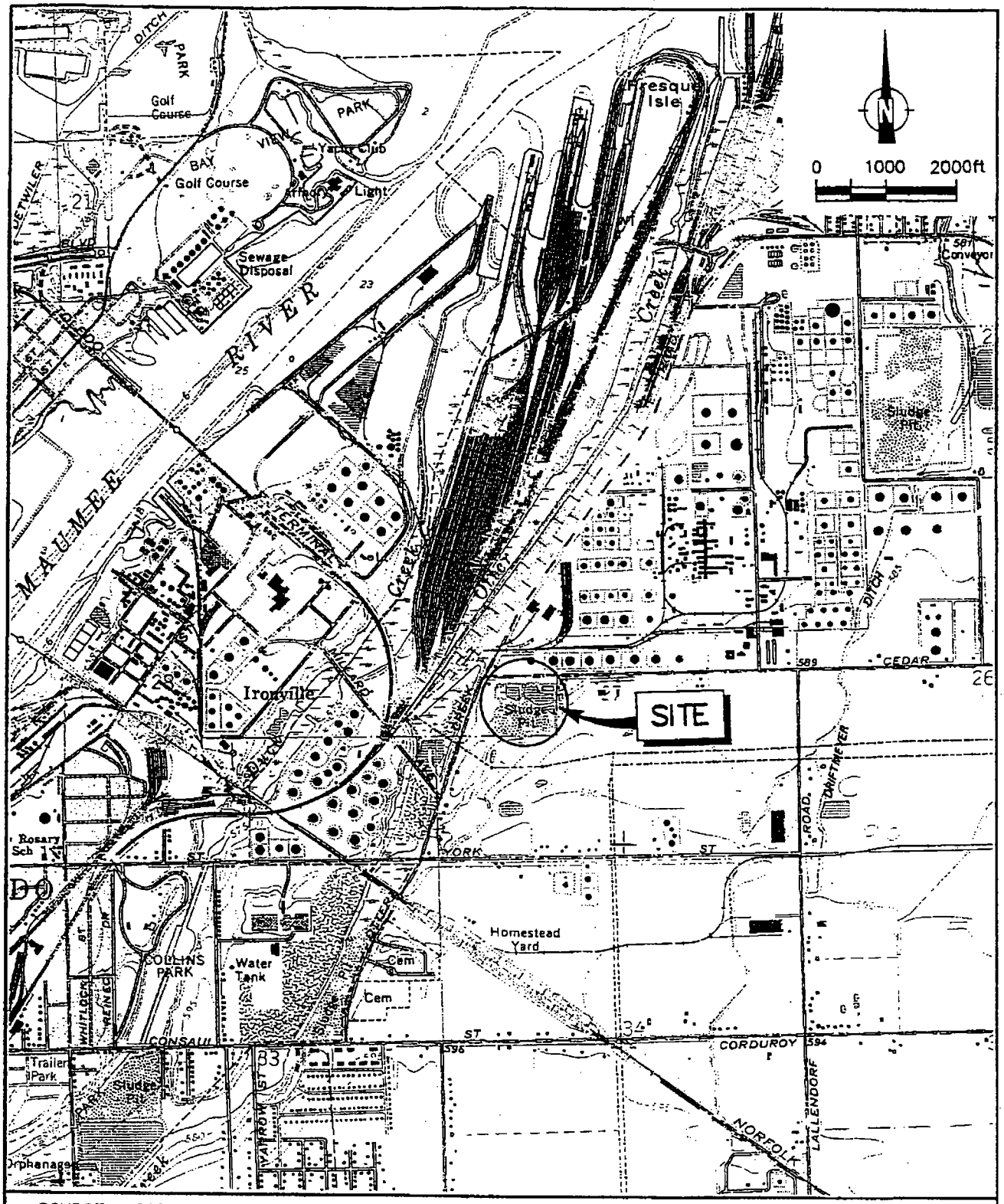
The SAMP involves the collection of leachate and groundwater samples at the Site. During the program, personnel may come in contact with materials that contain volatile organic compounds (VOCs), semi volatile organic compounds (SVOCs), metals, PCBs, or other hazardous substances. Therefore, provisions for health and safety will be implemented which are designed to ensure:

i) personnel working on-Site are not adversely exposed to contaminants;

ii) the health and safety of the general public and the environment is not compromised by migration of impacted materials off-Site; and

iii) compliance with applicable governmental and non-governmental (American Conference of Governmental Industrial Hygienists) regulations and guidelines.

A HASP under which this work will be completed has been prepared and is included as Appendix C of the O&M Plan.



SOURCE: USGS QUADRANGLE MAP
OREGON, OHIO

CRA

figure 1.1
SITE LOCATION
COMMERCIAL OIL SERVICES SITE
Oregon, Ohio

5649 (5) MAR 05/94 (W) REV. 0

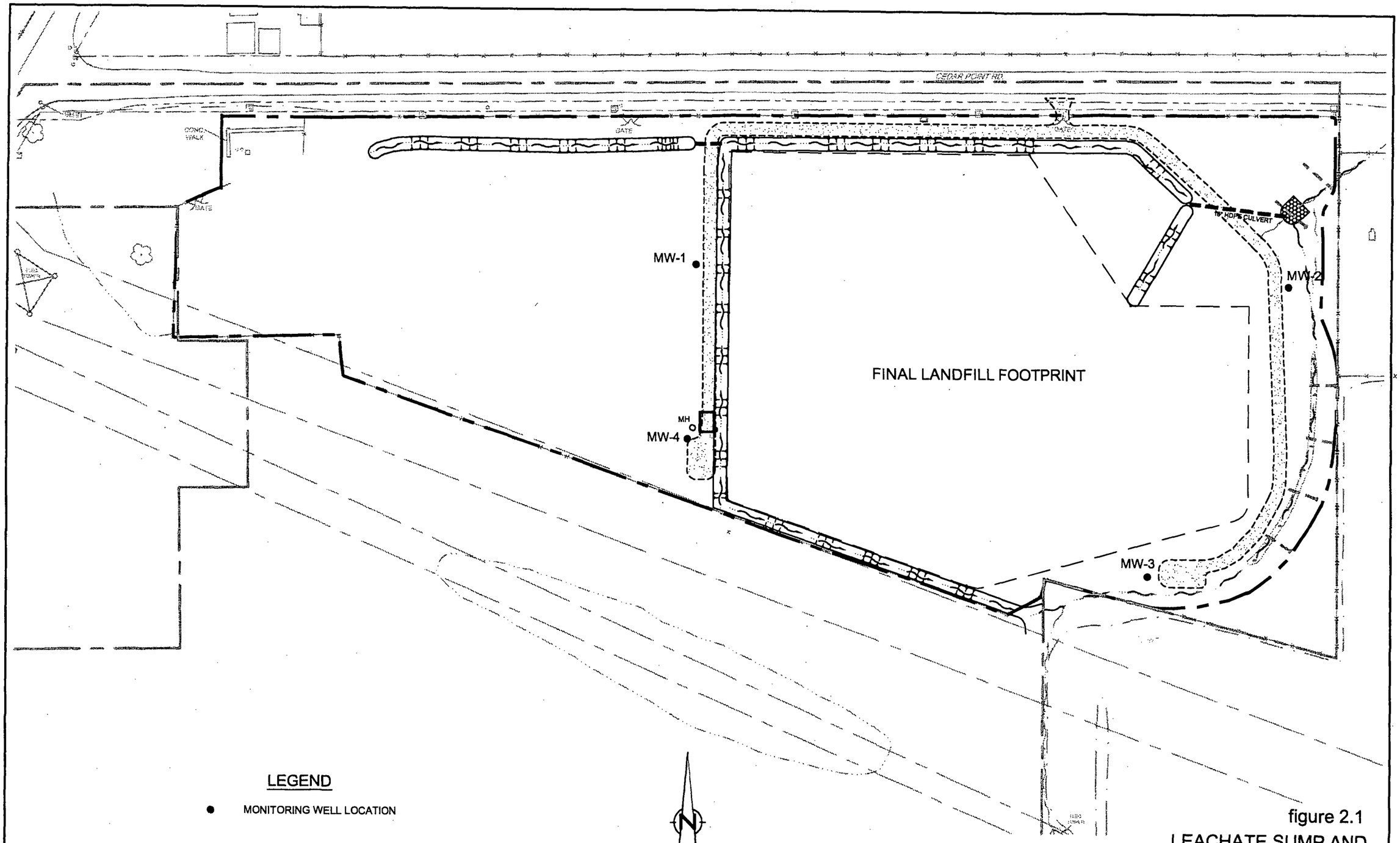


figure 2.1
LEACHATE SUMP AND
MONITORING WELL LOCATIONS
COMMERCIAL OIL SERVICES SITE
Oregon, Ohio

CRA

05649-37(018)GN-SP001 APR 26/2001

TABLE 2.1

OPERATION & MAINTENANCE SAMPLING SCHEDULE
COMMERCIAL OIL SERVICES SITE
OREGON, OHIO

SAMPLING PARAMETER	FREQUENCY		
	Year 2000	*Year 2001*	*Year 2002*
Groundwater Level	Monthly	Quarterly	Annually
Groundwater Quality	N/A	Quarterly	Annually
chloride			
iron			
manganese			
phenols			
sodium			
sulfate			
Groundwater Contamination Indicators	N/A	Quarterly	Semi-Annually
pH			
specific conductance			
total organic carbon			
total organic halogen			
Groundwater Drinking Water Suitability	N/A	Quarterly	N/A
arsenic			
barium			
cadmium			
chromium			
fluoride			
lead			
mercury			
nitrate (as N)			
selenium			
silver			
Lindane			
Methoxychlor			
Endrin			
Toxaphene			
2,4-D			
2,4,5-TP Silvex			
radium			
gross alpha			
gross beta			
coliform bacteria			
Leachate Waste Characterization	(1)	(1)	(1)
to be determined based on			
requirements of disposal facility			

Notes:

(1) Sampling will occur when leachate collection sump approaches capacity. (As part of the Operation and Maintenance Plan, leachate levels will be recorded concurrent with scheduled Site inspections, i.e., quarterly or semi-annually, as appropriate.)

ATTACHMENT A

MONITORING WELL INSTALLATION REPORT

Midwest
Environmental
Consultants, Inc.
Toledo • Ann Arbor • Detroit

MONITORING WELL INSTALLATION REPORT

COMMERCIAL OIL SERVICES SITE
3600 CEDAR POINT ROAD
OREGON, OHIO 43616

DECEMBER 2, 1999

PREPARED FOR:

SEVENSON ENVIRONMENTAL SERVICES, INC.
2749 LOCKPORT ROAD
NIAGRA FALLS, NEW YORK 14302

PREPARED BY:

MIDWEST ENVIORONMENTAL CONSULTANTS, INC.
1800 INDIAN WOOD CIRCLE
MAUMEE, OHIO 43537

INTRODUCTION

MEC provided field personnel to monitor and document the installation of four ground water monitoring wells at the Commercial Oil Services Site in Oregon, Ohio on November 3 and 4, 1999. The monitoring and documentation was conducted in accordance with Section 02018 "Monitoring Wells" of the job specifications, as clarified by CRA.

1.0 Well Borehole

Four monitoring wells were installed at the Commercial Oil Services Site at 3600 Cedar Point Road in Oregon, Ohio. These wells generally ring the landfill area and were installed at the locations designated by ENGINEER (Conestoga Rovers & Associates (CRA)), as required by project specifications. Each well was drilled at least two feet into native soils; the depths of the wells range from sixteen feet deep at MW-2 to twenty feet deep at MW-1.

Toltest, Inc. conducted drilling on November 3 and 4, 1999 using a CME-75 truck mounted drill rig. Toltest's equipment list and copies of the driller's resumes can be found in Appendix C.

Four 1/4" ID hollow stem augers were used to advance the borehole. Two-foot long split-spoon samples were taken continuously from ground surface to the bottom of the borehole. The split-spoon samples were used to log the borehole. No soil samples were taken for analytical or physical property testing.

The soil materials logged at each borehole location were a combination of grey/brown clay and silt, with occasional traces of sand. The borehole for MW-2 contained dry organic debris. The material at MW-1 and MW-4 is listed as recompacted common fill. A one-foot thick layer of crushed, coarse concrete was encountered at 15 feet below ground level in the boring for MW-1. Borings were stopped at each location once the borehole had been advanced a minimum of two feet into the native, unweathered clay (grey) zone. This target was attained at all four wells.

Material from each split spoon sample was inspected to determine the relative amount of water contained in the soil at the depth corresponding to each split spoon sample. Water and saturated material were found in the borehole for MW-2 but not in any of the other borings. The upper twelve feet of material at MW-2 was logged as "Dry" then water was encountered in the split spoon for the twelve to fourteen foot interval. Drilling continued for two additional feet; the material in the next split spoon was identified as saturated gray clay. The gray clay signified native soil was reached, therefore this boring was terminated at sixteen feet. The need to develop each monitoring well was determined by CRA. MEC personnel did not developing any of the monitoring wells at this site, based upon direction from CRA.

Commercial Oil Services Site Monitoring Well Table **Table 1**				
	MW-1	MW-2	MW-3	MW-4
Depth of Well (feet)	19	16	17	20
Northing	862.2	842.2	528.5	673.4
Easting	589.3	1227.4	1077.8	581.3
Top of Protective Casing Elevation	595.3	589.6	589.6	596.14
Top of PVC Casing Elevation	595.0	589.1	589.2	595.7
Top of Concrete Elevation	592.6	586.7	586.9	593.3
Length of Screen (feet)	10	10	10	10

5.0 Summary

Four monitoring wells were installed at the Commercial Oil Services Site at 3600 Cedar Point Road in Oregon, Ohio on November 3 and 4 1999. Each well was drilled until the borehole extended at least two feet into native soil represented by gray clay. Continuous split spoon samples were taken to aid in logging the boreholes and to confirm the boreholes reached the target gray clay zone.

All four monitoring wells were constructed of schedule 40 PVC. A ten-foot long well screen was installed in the lowest portion of each well. The remainder of each well is solid PVC extending roughly two and a half feet above ground surface. Each well is protected by a locking six-inch diameter carbon steel protective casing that extends approximately two feet into the ground. In addition, each well has three protective posts ringing it.

The monitoring wells were surveyed following installation to record their locations on the site's coordinate grid system. Each monitoring well was installed in substantial compliance with Section 02018 "Monitoring Wells" of the job specifications as clarified by CRA.

SOIL BORING LOG

PROJECT NAME: Commercial Oil | CLIENT: Sevenson | PAGE 1 OF 1

PROJECT NO: S191A3H | LOCATION: Commercial Oil, Oregon, Ohio

DATES BEGUN/COMPLETED: 11-3-99/11-3-99 | BORING NO: SB-1 | FIELD

GROUND SURFACE ELEV.: 592.4 | GROUNDWATER DEPTH: N/A | PERSONNEL: Troy Anderson

CONTRACTOR: Toltest, Inc. | GROUNDWATER ELEV./DATE: N/A

DRILLER: Jay Leonard | RIG: CME

DRILLING METHOD: 4.25 in. ID Hollow-Stem Auger | CHECKED BY:

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS	FIELD SCREENING RESULTS % LEL	FIELD SCREENING RESULTS (ppm)	REMARKS
	0.00	B-1 0-2'	5 5 7 6	.83		CLAY: Gray/Brown, Medium density, Slight Plasticity, with trace sand.	CL			Recompacted Fill
		B-1 2'-4'	7 7 6 6	.08						
	-5.00	B-1 4'-6'	3 3 4 5	.66						
		B-1 6'-8'	3 3 4 5	.58						
		B-1 8'-10'	1 2 2 4	.92						
	-10.00	B-1 10'-12'	3 4 4 5	.83						
		B-1 12'-14'	3 4 6 5	1.0		CLAY: Gray/Brown, Medium density, Slight Plasticity, with trace subrounded gravel				
		B-1 14'-16'	7 5 4 4	1.25		CONCRETE: Coarse, crushed concrete				
	-15.00					CLAY: Gray/Brown, Medium density, Slight Plasticity, with trace sand	N/A			Crushed Concrete
		B-1 16'-18'	4 4 5 6	1.25			CL			Recompacted Fill
						CLAY: Gray with Reddish tint, Low-Medium density, High plasticity, with trace silt.	CL			Native Soil
		B-1 18'-19'	2 2	1.0						End Boring at 19'
	-20.00									

SOIL BORING LOG

PROJECT NAME: Commercial Oil | CLIENT: Sevenson | PAGE 1 OF 1

PROJECT NO: S191A3H | LOCATION: Commercial Oil, Oregon, Ohio

DATES BEGUN/COMPLETED: 11-4-99/11-4-99 | BORING NO: SB-3 | FIELD

GROUND SURFACE ELEV.: 586 9 | GROUNDWATER DEPTH: N/A | PERSONNEL: Troy Anderson

CONTRACTOR: Toltest, Inc. | GROUNDWATER ELEV./DATE: N/A

DRILLER: Jay Leonard | RIG: CME

DRILLING METHOD: 4.25 in. ID Hollow-Stem Auger | CHECKED BY:

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS	FIELD SCREENING RESULTS % LEL	FIELD SCREENING RESULTS (ppm)	REMARKS
	0.00	B-3 0-2'	4 5 7 7	1.25		SILTY CLAY: Brown, Dilatant, Medium Plasticity, Trace sand Dry	CL/ ML			
		B-3 2'-4'	5 6 7 9	1.50						
	-5.00	B-3 4'-6'	2 3 5 5	1.66						
		B-3 6'-8'	7 7 8 8	1.66		SILTY CLAY: Brown, Dilatant, Medium Plasticity, Some silt Dry				
		B-3 8'-10'	2 2 3 3	2.0						
	-10.00	B-3 10'-12'	1 2 3 4	2.0						
		B-3 12'-14'	2 4 4 4	1.0						
		B-3 14'-16'	2 2 2 2	0.83						
	-15.00	B-3 16'-17'	2 2	1.0		CLAY: Gray, Dilatant, Medium Plasticity, Low density. Dry	CL			Native Soil End Boring at 17'
	-20.00									

Appendix B

Well Construction Details

WELL CONSTRUCTION DETAIL

PROJECT NAME: Commercial Oil Services Site
CLIENT: Sevenson
PAGE 1 OF 4

PROJECT NO: S191A3H
LOCATION: N 862.2 E 589.3

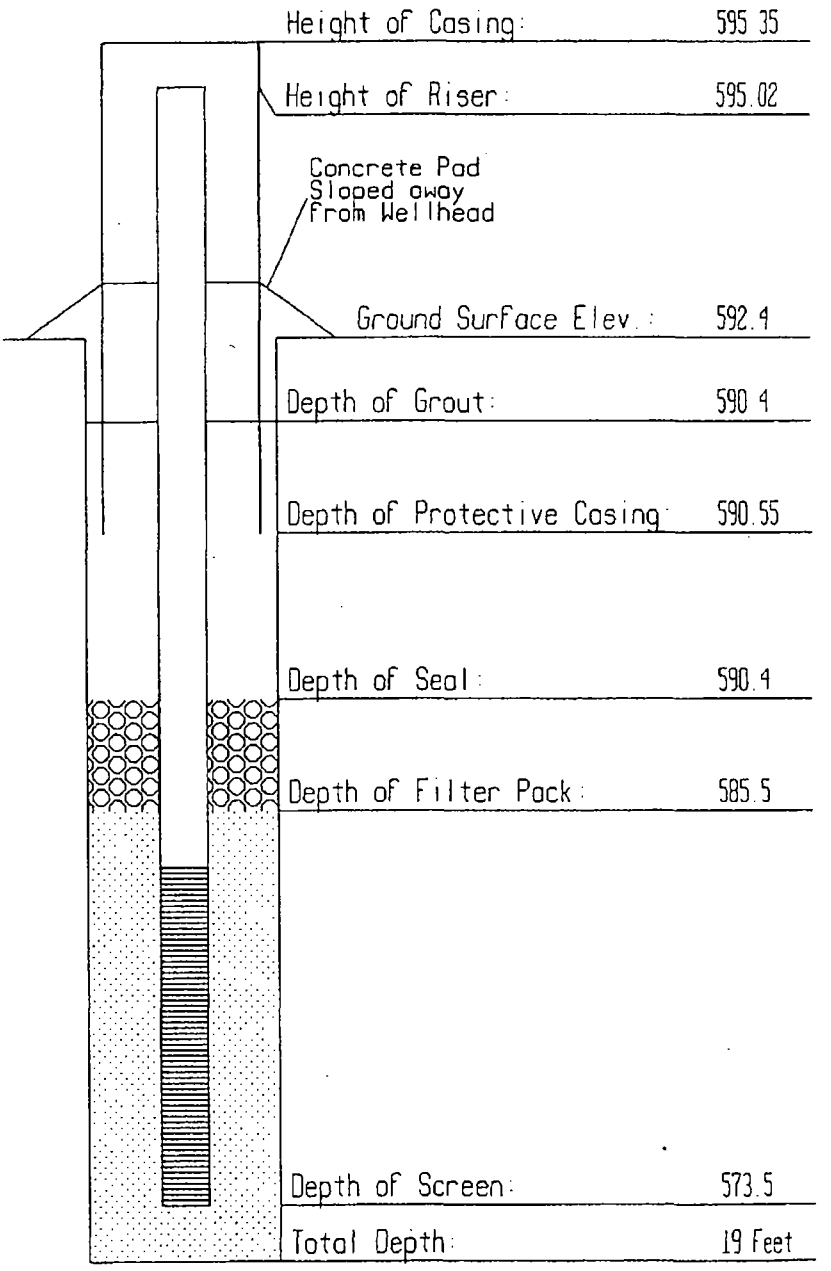
DATES BEGUN/COMPLETED: 11-3-99/11-3-99
WELL NO: MW-1
FIELD

GROUND SURFACE ELEV.: 592.4
GROUNDWATER ELEV.:
PERSONNEL: Troy Anderson

CONTRACTOR: TolTest, Inc.
BOREHOLE DIAMETER: Soils: 8.25 inches Rock: Not Applicable

DRILLER: Jay Leonard
CHECKED BY:

Material of Construction PVC
Schedule 40
Diameter 2 inches
Riser Length 11.95 feet
Screen Length 10 feet
Slot Size 0.010 inches
Protective Casing Material: Carbon Steel
Locking? yes
Grout Material: N/A Cement was used
Seal Material: Bentonite Chips
Filter Pack Material: #5 Silica Sand



Not to Scale

Remarks:

No groundwater was encountered in this well. The depth of grout listed on the diagram is the depth of the concrete in the borehole.

WELL CONSTRUCTION DETAIL

PROJECT NAME: Commercial Oil Services Site | CLIENT: Sevenson | PAGE 3 OF 4

PROJECT NO: S191A3H | LOCATION: N 528 5 E 1077.8

DATES BEGUN/COMPLETED: 11-4-99/11-4-99 | WELL NO: MW-3 | FIELD

GROUND SURFACE ELEV.: 586.9 | GROUNDWATER ELEV.: | PERSONNEL: Troy Anderson

CONTRACTOR: TolTest, Inc | BOREHOLE DIAMETER: Soils: 8.25 inches Rock: Not Applicable

DRILLER: Joy Leonard | CHECKED BY:

Material of Construction: PVC

Schedule: 40

Diameter: 2 inches

Riser Length: 9.3 feet

Screen Length: 10 feet

Slot Size: 0.010 inches

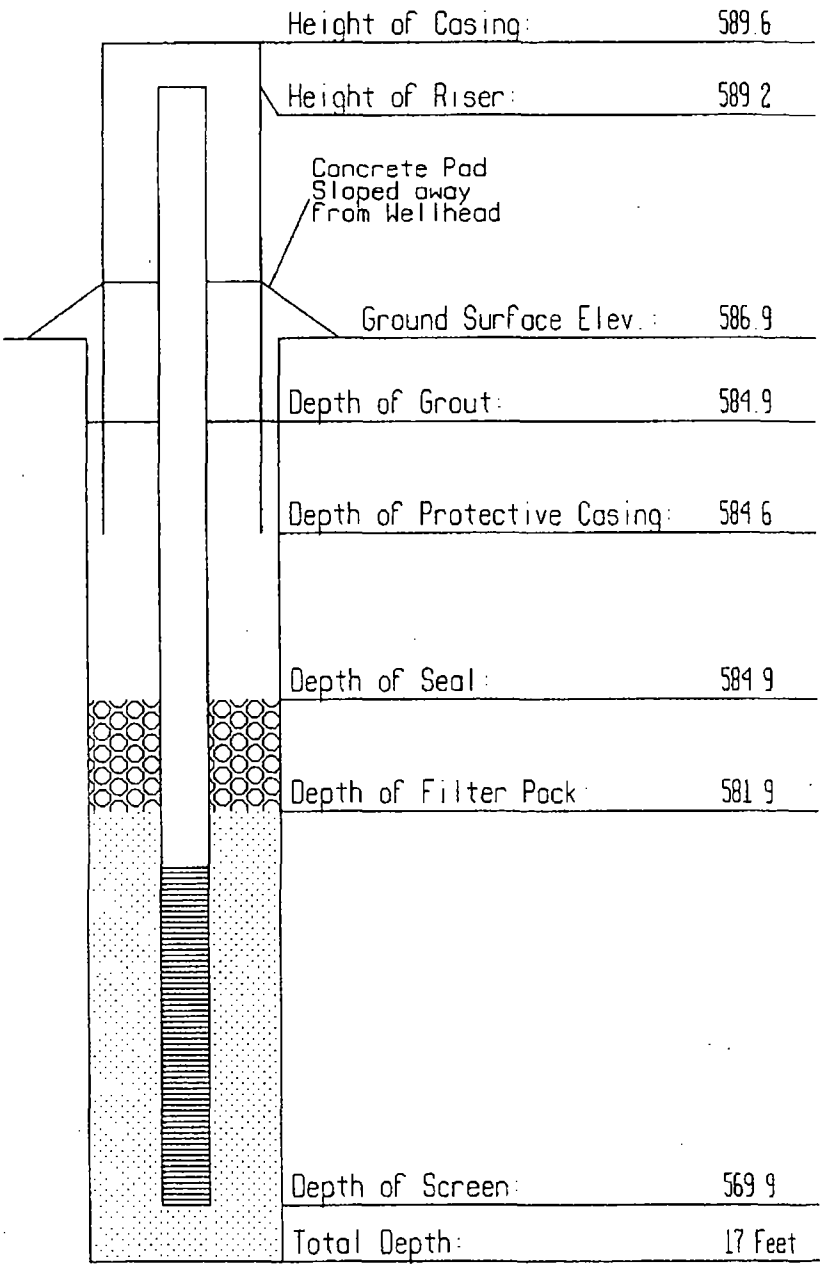
Protective Casing Material: Carbon Steel

Locking? yes

Grout Material: N/A Cement was used

Seal Material: Bentonite Chips

Filter Pack Material: #5 Silica Sand



Not to Scale

Remarks:

No groundwater was encountered in this well. The depth of grout listed on the diagram is the depth of the concrete in the borehole.

Appendix C

Toltest Equipment List
And
Resumes

TOLTEST, INC.

Founded in 1927
Toledo, Ohio • Detroit, Michigan • Plymouth, Michigan • Pittsburgh, Pennsylvania

August 12, 1999

Proposal No. 38436.01

Mr. Jim Adams
Midwest Environmental Consultants, Inc.
1800 Indian Wood Circle
Maumee, Ohio 43537

Monitoring Well Installation Services
MEC# E98170P
Oregon, Ohio

Dear Mr. Adams:

TolTest appreciates the opportunity to be chosen to perform environmental drilling and monitoring well installation at the above-referenced project.

Enclosed is the documentation that you requested per our phone conversation on Monday, August 9, 1999. The following information is included:

- A list of the drilling equipment presently owned and operated by TolTest.
- Resumes that highlight some key projects, types of equipment operated, and qualifications of four associates who currently operate our drilling equipment.

If you need any additional information, please call me at (419) 241-7175.

Sincerely,

TolTest, Inc.

Rick Mielcarek
Manager, Drilling Services

Rjm/drill/admin/memo/mec or

a. Name and Title:
NEIL L. WIKTOR
Lead Driller

b. Project Assignment:
Driller/Sampler

c. Name of Firm with which associated:
TolTest, Inc.

d. Years experience:
With this firm – 20 With other firms - 7

e. Education: Degrees/Years/Specialization

f. Active Registration: Year First Registered/Discipline
Certifications:
1987/OSHA 40-Hour Health & Safety
1991/Commercial Driver's License
1996/OSHA 8-Hour Supervisor Training
1997/DOT HM-126 Shipping of Hazardous Material

g. Other Experience and Qualifications relevant to the proposed project:

Over 25 years and 3000 projects of drilling experience in the Great Lakes Region

Qualified in the operation of CME 75, CME 55 and Mobile B-57 truck-mounted drills; CME 550 all terrain rubber-tired drill; CME 45 trailer/skid mounted rig; and CME 45 track driven rig

Performs solid stem and hollow stem auger drilling, NX and wireline rock coring, tricone and air rotary, and visually classifies soil samples for the preparation of field logs

Performs SPT and split barrel sampling, CME continuous sampling, thin walled shelby tube sampling and hydropunch water sampling. He also performs vane shear, static load, quasi-static cone penetration, dutch cone, and double packer rock permeability testing as well as field California Bearing Tests

Representative project experience:

- USACE, Detroit District, Portage Lake Harbor, Michigan, Driller/Sampler - Drilled and sampled eight borings to depths of 40 to 80 feet at various locations along the north and south revetments to determine the type, nature and engineering characteristics of subsurface materials in the vicinity of the USACE navigation structure. Seven borings were drilled from a barge and one boring drilled along the beach. All drilling was supervised by a professional geologist.

- **Geotechnical Subsurface Investigation**, Maumee River Crossing, Ohio Department of Transportation, Driller/Sampler - Project included reconnaissance and planning, drilling of test borings on both land and water, sampling of subsurface strata, sealing of boreholes, and water hauling for rock coring.

- **HTRW Remedial Investigation**, Cherokee Run Landfill, Bellefontaine, Ohio, Driller/Sampler - Remedial investigation of an existing landfill, including the drilling and installation of rock wells up to 150 feet deep, the drilling of over 2,828 feet of borings, and the performance of double-packer permeability test.

- **Geotechnical Investigation**, North Star Steel, Monroe, Michigan, Driller/Sampler - Performed rock coring to approximately 60 feet below ground surface for original plant construction. Project resulted in further work for additional buildings and equipment.

- **HTRW Landfill Investigation**, King Road Landfill, Ohio, Driller/Sampler - Remedial investigation of an existing landfill, including the drilling and installation of rock wells to 90 feet deep using the tricone rotary wash method. The project included advancement of over 60 soil borings and the installation of 30 monitoring wells.

- **Offshore Drilling and Soil Testing**, US Coast Guard, Toledo Harbor Light Structures, Driller/Sampler - Performed a subsurface soil investigation using a drill rig operating from a commercial barge with tug. The borings were located using GPR and advanced six miles off shore at the Toledo Harbor and Sandusky Bay Exit Channel. Borings were drilled to a depth of 80 feet using 3.75-inch hollow stem augers or casing with water rotary techniques to rock and 5-foot NX diamond core barrel to drill through the rock. Soil samples were collected using a split-spoon sampler and shelby tube and were tested for in-place moisture content, grain size analyses, dry density, and triaxial compression.

- **Offshore Drilling**, Portage River Crossing, Ottawa County Commissioners, Oak Harbor, Ohio, Driller/Sampler - Performed subsurface soil investigation for the regional water system drilling two borings from a commercial barge and two borings along the river bank. Four rock probes were drilled at locations up to 2,000 feet off the north and south shores. Soil samples were collected using a split-spoon sampler and SPTs were conducted. Data from laboratory testing was used for construction recommendations and consolidation settlement analyses.

a. Name and Title:
ROBERT G. GOLLIHUE
Level V Driller

b. Project Assignment:
Driller/Sampler

c. Name of Firm with which associated:
TolTest, Inc.

d. Years experience:
With this firm – 7 With other firms - 8

e. Education: Degrees/Years/Specialization

f. Active Registration: Year First Registered/Discipline
Certification:
1992/OSHA 40-Hour Health & Safety
1996/OSHA 8-Hour Supervisor Training
1997/DOT HM-126 Shipping of Hazardous Material

g. Other Experience and Qualifications relevant to the proposed project:

Over 15 years of drilling experience in the Great Lakes Region with participation in over 2500 geotechnical and environmental projects

Specialized drilling experience includes slope drilling for stability analysis, swampy terrain and off-shore drilling, drilling through contaminated material, and drilling at depths of 150 feet or more

Testing experience includes SPT, split barrel sampling, piston sampling, thin walled Shelby tube sampling, hydropunch water sampling, California Bearing Ration tests, cone penetration tests, static load tests, and double packer rock permeability tests.

Representative project experience:

» **HTRW Soils Investigation**, DOE, Miamisburg, Ohio, Driller/Sampler – Performed drilling/sampling operations at the Mound Plant, a DOE **Superfund site.** Investigation included drilling of 230 soil borings on a detailed grid pattern at 20-foot spacings covering three potentially **contaminated slopes. Continuous soil sampling** was performed to determine *levels of radioactive tritium contamination with continuous SPT tests* for soil sampling. All borings were advanced in **difficult access areas** with an ATV drill rig capable of **drilling vertical borings on 30 degree side slope stream banks.** Project required detailed H&S and Rad II training, direct supervision of DOE site construction inspectors, continuous monitoring for radiation and respiratory safety, and Level C PPE. Project expertise, quality, and cost-control measures were highly commended by the client.

» Route 30 Realignment, ODOT, Driller/Sampler - Boring locations and depths per ODOT guidelines for land drilling of **290 borings that included soil sampling by STP, undisturbed shelby tube and rock coring.** Samples were obtained for laboratory analysis. Project was completed in compliance with budget and performance schedules.

» Remedial Investigation, Cherokee Run Landfill, Bellefontaine, Ohio, Driller/Sampler - Project entailed drilling and sampling at an existing landfill including **installation of rock wells up to 150 feet deep, advancement of over 2,828 feet of borings and performance of double-packer permeability testing.** Project was completed with the highest attention to quality and in compliance with performance schedule.

» **Geotechnical Borings** for Roadways and Bridges, State Route 2, ODOT, Driller/Sampler - Performed **drilling of over 500 geotechnical borings** along 28 miles of roadway. Borings ranged from 10 to 65 feet deep, including over 200 feet of rock coring, and were advanced with truck, all terrain, and off-shore rigs.

» **Slope Stability**, State Route 22, ODOT, Steubenville, Ohio, Driller - Advanced borings to set three stage inclinometers to measure slope movement.

ATTACHMENT B

WELL DEVELOPMENT AND STABILIZATION FORM

CRA
CONESTOGA–ROVERS & ASSOCIATES
11100 METRO AIRPORT CENTER DRIVE
ROMULUS, MI. 48174 (313)942–0909

SHIPPED TO (Laboratory Name):

REFERENCE NUMBER:

SAMPLER'S SIGNATURE: _____ PRINTED NAME: _____

SEQ. No.	DATE	TIME	SAMPLE No.	SAMPLE TYPE	No. OF CONTAINERS	PARAMETERS	REMARKS
TOTAL NUMBER OF CONTAINERS						HEALTH/CHEMICAL HAZARDS	

RELINQUISHED BY: ① _____	DATE: / TIME:	RECEIVED BY: ② _____	DATE: / TIME:
RELINQUISHED BY: ② _____	DATE: / TIME:	RECEIVED BY: ③ _____	DATE: / TIME:
RELINQUISHED BY: ③ _____	DATE: / TIME:	RECEIVED BY: ④ _____	DATE: / TIME:

METHOD OF SHIPMENT: WAY BILL No.

White –Fully Executed Copy
Yellow –Receiving Laboratory Copy
Pink –Shipper Copy
Goldenrod –Sampler Copy

SAMPLE TEAM: _____ _____

RECEIVED FOR LABORATORY BY: _____
DATE: _____ TIME: _____

Attachment B
CHAIN–OF–CUSTODY FORM
COMMERCIAL OIL SERVICES SITE
Oregon, Ohio

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN

FINAL OPERATION AND MAINTENANCE PLAN
LAGOON CLOSURE REMOVAL ACTION
COMMERCIAL OIL SERVICES SITE
OREGON, OHIO

Prepared By:

APRIL 2001
REF. NO. 5649 (16)
This report is printed on recycled paper.

Conestoga-Rovers & Associates
1801 Old Highway 8 N.W., Suite 114
St. Paul, Minnesota 55112
Office: (651) 639-0913 Fax: (651) 639-0923

QUALITY ASSURANCE PROJECT PLAN (QAPP)

PROJECT TITLE: Commercial Oil Services Site
Operation & Maintenance QAPP
Oregon, Ohio

PREPARED BY: CONESTOGA-ROVERS & ASSOCIATES (CRA)

Approved By: _____ Date: _____
Project Coordinator - Commercial Oil Services
Phase II Group Representative

Approved By: _____ Date: _____
Project Manager - O&M Contractor

Approved By: _____ Date: _____
Project Supervisor - O&M Contractor

Approved By: _____ Date: _____
QA/QC Officer - O&M Contractor
Analytical and Field Activities

Approved By: _____ Date: _____
Project Manager - Project Laboratory
Laboratory Activities

Approved By: _____ Date: _____
QA Officer - Project Laboratory
Laboratory Activities

QUALITY ASSURANCE PROJECT PLAN (QAPP)

PROJECT TITLE: Commercial Oil Services Site
Operation & Maintenance QAPP
Oregon, Ohio

PREPARED BY: CONESTOGA-ROVERS & ASSOCIATES (CRA)

Approved By: _____ Date: _____
USEPA Region V
On-Scene Coordinator
Sheila Sulivan

Approved By: _____ Date: _____
USEPA Region V
Quality Assurance Reviewer

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LIST OF ACRONYMS AND SHORT FORMS

CCV	-	Continuing Calibration Verification
CLP	-	Contract Laboratory Program
COS	-	Commercial Oil Services
CRA	-	Conestoga-Rovers & Associates
DQO	-	Data Quality Objective
GC	-	Gas Chromatography
GC/MS	-	Gas Chromatography/Mass Spectrometry
ICP	-	Inductively Coupled Argon Plasma
ICP/MS	-	Inductively Coupled Argon Plasma Mass Spectrometer
ICS	-	Interference Check Sample
ICV	-	Initial Calibration Verification
MS/MSD	-	Matrix Spike/Matrix Spike Duplicate
°C	-	Degree Centigrade
OEPA	-	Ohio Environmental Protection Agency
O&M Plan	-	Operational Maintenance Plan
MS/DUP	-	Matrix Spike/Sample Duplicate
PE	-	Performance Evaluation
QA	-	Quality Assurance
QA/QC	-	Quality Assurance/Quality Control
QAO	-	Quality Assurance Officer
QAPP	-	Quality Assurance Project Plan
QC	-	Quality Control
%R	-	Percent Recovery
RAS	-	Routine Analytical Services
RAWP	-	Removal Action Work Plan
RPD	-	Relative Percent Difference
RSD	-	Relative Standard Deviation
SAMP	-	Sampling, Analysis and Monitoring Plan
Site	-	Commercial Oil Services Site
SOPs	-	Standard Operating Procedures
SW-846	-	"Test Methods for Evaluating Solid Waste Physical/Chemical Methods", EPA SW-846, 3rd Edition, November 1986 and updates
USEPA	-	United States Environmental Protection Agency
VOC	-	Volatile Organic Compound

1.0 INTRODUCTION

The United States Environmental Protection Agency (USEPA) and the Ohio Environmental Protection Agency (OEPA) require that all environmental monitoring and measurement efforts mandated or supported by USEPA or OEPA participate in a centrally managed quality assurance (QA) program.

Any party generating data under this program has the responsibility to implement minimum procedures to assure that the precision, accuracy, completeness, and representativeness of its data are known and documented. To ensure the responsibility is met uniformly, each party must prepare a written QA Project Plan (QAPP) covering each project it is to perform.

This QAPP presents the organization, objectives, functional activities, and specific quality assurance (QA) and quality control (QC) activities associated with the long term Operation and Maintenance Plan (O&M Plan) at the Commercial Oil Services (COS) Site, (Site), in Oregon, Ohio. This QAPP also describes the specific protocols which will be followed for sampling, sample handling and storage, chain-of-custody, laboratory and field analysis.

All QA/QC procedures will be in accordance with applicable professional technical standards, USEPA requirements, government regulations and guidelines, and specific project goals and requirements. This QAPP has been prepared by Conestoga-Rovers & Associates (CRA) on behalf of the Commercial Oil Services (COS) Phase II Group using the USEPA QAPP guidance documents, "EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations", EPA QA/R-5, Draft Interim Final, August 1994, "Region 5 Model Superfund Quality Assurance Project Plan (QAPP)", USEPA Region v, May 1996, and the OEPA "Guidelines and Specifications for Preparing Quality Assurance Project Plans" (DERR-00-RR-003).

2.0 PROJECT DESCRIPTION

This QAPP has been developed for, and is part of, the long-term Operation and Maintenance Plan (O&M Plan) for the Site. The project description is presented in Sections 1.0 and 2.0 of the O&M Plan.

The O&M Plan has been prepared pursuant to the requirements of the approved "Phase II Removal Action Work Plan (RAWP)", Commercial Oil Services Site, Oregon, Ohio, prepared by McLaren Hart Engineers Midwest, Inc., May 14, 1983 (included as Appendix E of the Administrative Order on Consent issued by the USEPA on February 17, 1994) and the USEPA approved "Final Removal Action Design for Lagoons", Commercial Oil Services Site, Oregon, Ohio, dated February 1997.

2.1 SITE BACKGROUND

A detailed Site Description is presented in Section 2.0 of the O&M Plan.

2.2 SAMPLING NETWORK AND RATIONALE

The sampling network and rationale specified in Section 4.0 of the O&M Plan.

2.3 PROJECT OBJECTIVES AND SCOPE

This QAPP has been prepared in support of the O&M Plan to provide QA/QC procedures and requirements for the monitoring requirements specified in Section 4.0 of the O&M Plan to be performed during the long-term operation, maintenance and monitoring of the Site. Specific objectives of the data collection activities include:

i) monitor and management of the leachate collection system;

ii) monitoring for evidence of releases to the environment of hazardous substances or contaminants from the Site containment cell.

fThe evaluation of the data collected will determine if the containment cell and leachate collection system are performing to their design criteria and whether the contingency measures outlined in the O&M Plan require implementation.

2.4 PARAMETERS TO BE TESTED AND FREQUENCY

Sample matrices, analytical parameters and frequencies of sample collection are presented in Table 2.1.

2.5 DATA QUALITY OBJECTIVES (DQOs)

DQOs are qualitative and quantitative statements derived from the outputs of each step of the DQO process. The DQO process is a series of planning steps based on the scientific method that is designed to ensure that the type, quantity and quality of environmental data used in decision making are appropriate for the intended application.

There are seven steps in the DQO process which include:

i) state the problem;
ii) identify the decision;
iii) identify inputs to the decision;
iv) define the study boundaries;
v) develop a decision rule;
vi) specify limits on decision errors; and
vii) optimize the design for obtaining data.

The DQOs derived from this process are used to develop a scientific and resource-effective sampling design. The DQOs for the O&M Plan were developed in part using the USEPA guidance document entitled "Data Quality Objectives Process for Superfund, Interim Final Guidance", EPA540-R-93-071, September 1993. The type, quantity and quality of environmental data to be collected during the operation and monitoring period have been determined to be appropriate for the intended application.

TABLE 2.1

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM
COMMERCIAL OIL SERVICES SITE
OREGON, OHIO

Matrix	*Field Parameters*	*Laboratory Parameters*	*Investigative Samples*	*QC Samples*			*Total (2) Per Round*	*Year One Frequency*	*Year One Total*	*Subsequent Frequency*	*Subsequent Yearly Total*
				Field Blanks	*Field Duplicates*	*MS/DUP MS/MSD (1)*					
Groundwater	pH Groundwater Elevations Specific Conductance Temperature	Groundwater Quality Chloride Phenolics, total Sulfate Metals (3)	4	1 (4)	1	1	5	Quarterly	20	Annually	5
		Groundwater Contamination Indicators Total Organic Carbon (TOC) Total Organic Halides (TOX)	4	1 (4)	1	1	5	Quarterly	20	Semi-Annually	10
		Drinking Water Suitability Metals (5) Pesticides (6) Herbicides (7) Inorganics (8) Radiochemistry (9) Total Coliform	4	1 (4)	1	1	5	Quarterly	20	–	–
Leachate		Waste Characterization (10)	TBD	0	0	0	TBD	TBD	TBD	TBD	TBD

Notes:

(1) Matrix spike/matrix spike duplicate (MS/MSD) analyses are required for organic analyses. Samples designated for MS/MSD analyses will be collected, with extra sample volumes for water samples, at a frequency of one per group of 20 or fewer investigative samples. *Triple the normal sample volumes will be collected for extractable organics. Inorganic analyses require one matrix* spike/laboratory duplicate (MS/DUP) to be analyzed at a frequency of one per group of 20 or fewer investigative samples.

(2) The Laboratory MS/MSD and MS/DUP samples are not included in the totals.

(3) Groundwater Quality Metals - Iron, Manganese and Sodium.

(4) May be eliminated if dedicated sampling equipment is utilized.

(5) Drinking Water Metals, - Arsenic, Barium Cadmium, Chromium, Lead, Mercury, Selenium and Silver.

(6) Drinking Water Pesticides - Endrin, Lindane, Methoxychlor and Toxaphene.

(7) Drinking Water Herbicides - 2,4-D and 2,4,5-TP (Silvex).

(8) Drinking Water Inorganics - Fluoride and Nitrate-Nitrogen.

(9) Drinking Water Radiochemistry - Radium, Gross Alpha and Beta.

(10) Waste Characterization Parameters will be determined based on method of disposal.

TBD To be determined.

2.6 MONITORING SCHEDULE

The monitoring schedule is presented in the O&M Plan.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITY

The O&M Contractor to the Commercial Oil Services Site Group (Group) has overall responsibility for the O&M activities at the Site. The O&M Contractor will perform all sampling, monitor well purging and field analyses.

An approved laboratory as the analytical subcontractor to the O&M Contractor, will perform all analyses of samples collected during the Site groundwater monitoring and leachate characterization activities.

All firms will provide project management as appropriate to their responsibilities. The O&M Contractor will provide administrative oversight and QA/QC for all deliverables. The O&M Contractor will maintain a file copy of all laboratory deliverables. All final project deliverables will be issued by the O&M Contractor.

A summary of the key personnel with QA responsibilities follows:

COS Phase II Group Representative

- general overview of the project to ensure that the Group's objectives are met;
- participation in key negotiations with the USEPA;
- management guidance to the O&M Contractor's Project Manager; and
- approval of QAPP.

Project Manager - O&M Contractor

- management of the O&M Contractor project team;
- participation in key technical negotiations with the USEPA and COS Phase II Group;
- meetings with the USEPA and OEPA; and
- approval of QAPP.

Project Supervisor - O&M Contractor

- overview of field activities;
- overview of laboratory activities;
- decide laboratory data corrective action;
- data assessment;

- preparation and review of reports;
- technical representation of project activities;
- coordinate O&M Contractor's technical group; and
- approval of QAPP.

QA/QC Officer - Analytical and Field Activities - O&M Contractor

- system audits - laboratory activities;
- overview and review field QA/QC;
- coordinate supply of performance evaluation samples;
- review laboratory QA/QC;
- coordinate and oversee data validation and assessment;
- advise on data corrective action procedures;
- QA/QC representation of project activities;
- management of field activities and field QA/QC;
- preparation and review of O&M activities report;
- technical representation of field activities;
- preparation of standard operating procedures (SOPs) for field activities; and
- approval of QAPP.

Project Manager - Project Laboratory

- coordinate laboratory analyses;
- supervise in-house chain-of-custody;
- schedule sample analyses;
- overview data review;
- overview preparation of analytical reports; and
- approval of the QAPP.

Operations Manager - Project Laboratory

- coordinate laboratory analysis;
- supervise in-house chain-of-custody;
- schedule sample analyses;

- oversee data review;
- oversee preparation of analytical reports; and
- approve final analytical reports prior to submission to O&M Contractor.

QA Officer - Project Laboratory

- overview laboratory quality assurance;
- overview QA/QC documentation;
- conduct detailed data review;
- decide laboratory actions, if required;
- technical representation of laboratory QA procedures;
- preparation of laboratory SOPs; and
- approval of the QAPP.

Sample Custodian - Project Laboratory

- receive and inspect the incoming sample containers;
- record the condition of incoming sample containers;
- sign appropriate documents;
- verify chain of custody and its correctness;
- notify project manager and operations manager of sample receipt and inspection;
- assign a unique identification number and customer number, and enter each sample into the sample receiving log;
- with the help of the operations manager, initiate transfer of the samples to appropriate lab sections; and
- control and monitor access to samples and log all sample movements.

Primary responsibility for project quality rests with the O&M Contractor's QA/QC Officer - Analytical and Field Activities. Ultimate responsibility for project quality rests with the O&M Contractor's Project Manager. Independent quality assurance will be provided by the laboratory's Project Manager and QA Officer prior to release of all data to the O&M Contractor.

USEPA RESPONSIBILITIES

The USEPA Region V On-Scene Coordinator will be responsible for overview of this project. The On-Scene Coordinator will also be responsible for providing approval of the QAPP. Sheila Sulivan is the On-Scene Coordinator for the Removal Action activities.

External performance and system audits of the laboratory will be performed at the discretion of USEPA Region V.

Additionally, the USEPA Region V Quality Assurance Reviewer is responsible for reviewing and for providing final approval of the QAPP.

4.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall QA objective for this project is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide results that are legally defensible in a court of law. Specific procedures for sampling, chain-of-custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal quality control, audits, preventive maintenance of field equipment, and corrective action are described in subsequent sections of this QAPP.

4.1 PRECISION

4.1.1 DEFINITION

Precision is a measure of the degree to which two or more measurements are in agreement.

4.1.2 FIELD PRECISION OBJECTIVES

Field precision for measurements associated with groundwater monitoring will be assessed through the collection and measurement of duplicate samples or calibration check solutions at a frequency of one per ten groundwater samples. The precision control limits for field measurements obtained during the O&M activities are summarized in the SOPs in Appendix A.

4.1.3 LABORATORY PRECISION OBJECTIVES

Precision in the laboratory will be assessed through the calculation of relative percent differences (RPDs) for replicate/duplicate samples. The equation to be used for calculating precision for this project can be found in Section 13.2 of this QAPP. Precision control limits for laboratory parameters will be provided by the project laboratory when chosen.

4.2 ACCURACY

4.2.1 DEFINITION

Accuracy is the degree of agreement between an observed value and an accepted reference value.

4.2.2 FIELD ACCURACY OBJECTIVES

Accuracy in the field is assessed through the use of field and trip blank samples and is ensured by observing all sample handling procedures, preservation requirements, and holding time periods. Accuracy of field measurements associated with groundwater monitoring will be assessed by analyzing calibration check solutions. Accuracy control limits for the field measurements obtained during the O&M activities are presented in the SOPs in Appendix A.

4.2.3 LABORATORY ACCURACY OBJECTIVES

Laboratory accuracy will be assessed by determining percent recoveries from the analysis of matrix spikes (MS), laboratory control samples (LCS), or standard reference materials (SRMs). The equation to be used for calculating accuracy for this project can be found in Section 13.1 of this QAPP. Accuracy control limits for laboratory parameters will be provided by the project laboratory when chosen.

Analytical sensitivity is also a measure of laboratory accuracy. The sensitivities required for the analyses will be the targeted quantitation limits presented in Table 4.1.

4.3 COMPLETENESS

4.3.1 DEFINITION

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions.

TABLE 4.1

TARGETED QUANTITATION LIMITS
COMMERCIAL OIL SERVICES SITE
OREGON, OHIO

Compound	*Targeted Quantitation Limits (1) Water (mg/L)*
Groundwater Quality Parameters	
Chloride	1.0
Iron	0.1
Manganese	0.05
Phenolics, total	0.02
Sodium	5
Sulfate	5.0
Groundwater Contamination Indicators	
Total Organic Carbon	1.0
Total Organic Halides	0.05
Drinking Water Suitability	
Metals	
Arsenic	0.01
Barium	0.1
Cadmium	0.005
Chromium	0.05
Lead	0.005
Mercury	0.0002
Selenium	0.01
Silver	0.01
Pesticides	
Endrin	0.002
Lindane	0.0002
Methoxychlor	0.04
Toxaphene	0.003
Herbicides	
2,4-D	0.07
2,4,5-TP Silvex	0.05
Inorganics	
Fluoride	1.0
Nitrate-Nitrogen	1.0
Radio Chemistry (pCi/L)	
Radium, total	5.0
Gross Alpha & Beta	15
Total Coliform (cfu/100ml)	10

Note:

(1) Please note that these are targeted quantitation limits. Actual quantitation limits may be higher due to matrix effects or a high concentration(s) of specific analytes and may not be achievable on all samples.

cfu - Colony forming units.

4.3.2 FIELD COMPLETENESS OBJECTIVES

Field completeness is a measure of the amount of valid field measurements obtained from all the measurements taken during the project. The equation for completeness is presented in Section 13.3 of this QAPP. The field completeness objective for this project will be greater than 90 percent.

4.3.3 LABORATORY COMPLETENESS OBJECTIVES

Laboratory completeness is a measure of the amount of valid laboratory measurements obtained from all the measurements taken during the project. The equation for completeness is presented in Section 13.3 of this QAPP. The laboratory completeness objective for this project will be greater than 95 percent.

4.4 REPRESENTATIVENESS

4.4.1 DEFINITION

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition.

4.4.2 MEASURES TO ENSURE REPRESENTATIVENESS OF FIELD DATA

Representativeness is dependent upon the proper design of the sampling program. Representativeness will be ensured by following the proper sampling protocols and using proper sampling techniques.

4.4.3 MEASURES TO ENSURE REPRESENTATIVENESS OF LABORATORY DATA

Representativeness in the laboratory is ensured by using the proper analytical procedures, meeting sample holding times, and analyzing and assessing field duplicate samples. The sampling network is designed to provide data representative of Site conditions. During development of this network, consideration has been given to past waste disposal practices, existing analytical data, physical setting and processes, and constraints inherent to the Superfund program. The rationale for the sampling network is discussed in Section 1.0 of the O&M Sampling and Analysis Plan.

4.5 COMPARABILITY

4.5.1 DEFINITION

Comparability is an expression of the confidence with which one data set can be compared with another. Comparability is also dependent on similar QA objectives.

4.5.2 MEASURES TO ENSURE COMPARABILITY OF FIELD DATA

Comparability is dependent upon the proper design of the sampling program and will be ensured by using proper sampling techniques.

4.5.3 MEASURES TO ENSURE COMPARABILITY OF LABORATORY DATA

The laboratory data to be gathered during the O&M activities will be comparable to previous data when similar sampling and analytical methods are used. Comparability is also dependent on similar QA objectives.

4.6 LEVEL OF QUALITY CONTROL EFFORT

Field blank, trip blank, method blank, field duplicate, matrix spike and laboratory duplicate samples will be analyzed to assess the quality of the laboratories' data resulting from the field sampling and analysis program.

Field and trip blank samples will be submitted to the laboratories' to provide the means to assess the quality of the data resulting from the field sampling program. Field blank samples are analyzed to check for contamination which may be introduced into the samples during the sampling procedures. Field blank samples will be submitted with groundwater samples collected during the O&M activities. Field blank samples consist of distilled water that has been used to rinse sampling equipment that has undergone the decontamination procedures specified in the O&M Sampling and Analysis Plan.

Trip blank samples are used to assess the potential for contamination of samples resulting from contaminant migration during sample shipment and storage. Trip blank samples pertain only to aqueous VOC samples. Trip blank samples that consist of ultra pure water are prepared in sample containers at the laboratory prior to the sampling event and are kept with the investigative samples throughout the sampling event. Trip blank samples will be packaged for shipment with other groundwater samples and submitted to the laboratory for analysis. One trip blank sample will be included in each cooler used to ship groundwater samples to the laboratory for VOC analysis. Trip blank sample containers will not be opened prior to analysis at the laboratory.

Method blank samples are generated within the laboratory and are used to assess contamination resulting from laboratory procedures.

Field duplicate samples are analyzed to assess the overall sampling and analytical reproducibility. Field duplicate samples are collected by alternately filling the sample containers for each parameter to be analyzed from the same sampling device.

Matrix spikes provide information about the effect of the sample matrix on the preparation and measurement methodology. Matrix spike samples are generally analyzed in duplicate and are referred to as matrix spike/matrix spike duplicate (MS/MSD) samples. MS/MSD samples are investigative samples which have been fortified (spiked) by the laboratory with a known amount of the analyte(s) of interest. Aqueous MS/MSD samples must be collected at triple the usual volume for VOCs, and

double the usual volume for extractable organics (e.g., semivolatile organic compounds, pesticides).

The level of the QC effort for groundwater will be one field duplicate sample and one field blank sample for every ten or fewer samples. One VOC trip blank sample consisting of laboratory-prepared ultra pure water will be included along with each shipment of groundwater VOC samples. One MS/MSD sample will be submitted with every 20 or fewer groundwater samples designated for organic, inorganic or general chemistry (where applicable) analyses. Alternately, laboratory control sample/laboratory duplicate (LCS/DUP) samples may be designated for some general chemistry analyses.

The level of QC effort for the field measurements are outlined in the SOPs provided in Appendix A.

5.0 SAMPLING PROCEDURES

The following subsections present the procedures for sampling the various media at the Site.

5.1 EQUIPMENT CLEANING

All sampling equipment which may come in contact with potentially contaminated materials shall be decontaminated prior to field use and after each sample is collected to prevent cross-contamination of the samples. Duplicate samples shall be collected concurrently with original samples, therefore, sampling equipment will not be decontaminated before collection of the duplicate. Decontamination of equipment will be performed as follows:

i) clean water and non-phosphate detergent wash using a brush, if necessary, to remove all visible foreign matter;

ii) rinse thoroughly with potable water;

iii) rinse with pesticide-grade isopropyl alcohol if organic residues are observed on sampling equipment;

iv) rinse thoroughly with deionized water;

v) allow the equipment to air dry on a clean plastic sheet as long as possible; and

vi) wrap in aluminum foil until use.

Following final rinse, openings will be visually inspected to verify they are free of particulates and other material which may contribute to possible sample cross-contamination.

Fluids used for cleaning will not be recycled. All wash water, rinse water and decontamination fluids will be disposed of as appropriate with state and federal regulations.

5.2 FIELD SAMPLING

5.2.1 SAMPLE LABELING

Each sample will be labeled with a unique sample number that will facilitate tracking and cross-referencing of sample information. The sample numbering system to be used is described as follows:

Example: GW-MMDDYY-XX-001

GW	- designates types of sample (GW-groundwater, L-Leachate)
MMDDYY	- designates date of collection presented as month/day/year
XX	- sampler's initials
001	- sequential number starting with 001 at the start of the project

Field QC samples also will be numbered with a unique sample site number, consistent with the numbering system described above to prevent laboratory bias of field QC samples.

5.2.2 FIELD LOG

The field logbook will be a bound document with consecutively numbered pages. The entries for each day will commence on a new page which will be dated. All entries will be made only in waterproof black ink. Corrections will be made by marking through the error with a single line, so as to remain legible, and initialing this action followed by writing the correction. The following information will be recorded in the field logbook for each sample collected:

i) site location identification;

ii) unique sample identification number;

iii) date and time (in military time format) of sample collection;

iv) weather conditions;

v) designation as to the sample matrix;

vi) designation as to the means of collection (grab, bailer, etc.);

vii) brief description of the sample;

viii) name of sampler;

ix) analyses to be performed on sample; and

x) any other relevant comments such as odor, staining, texture, filtering, preservation, etc.

5.2.3 CHAIN-OF-CUSTODY FORMS

Chain-of-custody records will be used to track all samples from time of sampling to the arrival of samples at the laboratory. Each sample container being shipped to the laboratory will contain a chain-of-custody form. The chain-of-custody form consists of four copies which are distributed to the sampler, to the shipper, to the laboratory and to the office file of the O&M Contractor. The sampler and shipper will maintain their copies while the other two copies are enclosed in a waterproof enclosure within the shipping container. The laboratory, upon receiving the samples, will complete the remaining copies. The laboratory will maintain one copy for its records. The executed original will be returned to the O&M Contractor with the data deliverables package. A typical chain-of-custody form is presented on Figure 5.1.

5.2.4 SAMPLE CONTAINERS AND HANDLING

Required sample containers, sample preservation methods, maximum holding times and filling instructions are provided in Table 5.1.

All samples will be placed in appropriate sample containers, labeled and properly sealed. The sample labels will include sample number, place of collection, date and time of collection and analyses to be performed. Samples will be cushioned within the shipping coolers by the use of vermiculite, foam chips and/or bubble wrap. Samples will be kept cool by the use of sealed plastic bags of ice.

Samples will be shipped by commercial courier on a daily basis to the Project Laboratory. The exception to this will be samples which are collected on a Sunday or holiday. For samples collected on a Sunday or holiday, additional ice will be placed in the coolers, the coolers will be sealed and kept in a designated secure area where it will be picked up by the courier on the next business day.

TABLE 5.1

CONTAINER, PRESERVATION, SHIPPING AND PACKAGING REQUIREMENTS
COMMERCIAL OIL SERVICES SITE
OREGON, OHIO

Analyses	*Sample Containers*	*Preservation*	*Maximum Holding Time from Sample Collection (1)*	*Volume of Sample*	*Shipping*	*Normal Packaging*
Groundwater						
Pesticides, Herbicides	Two 1-liter amber glass bottles per analysis	Iced, 4° C	7 days for extraction 40 days after extraction for analysis	Fill to neck of bottle	Federal Express Priority 1	Bubble Wrap or Foam Chips
Metals	One 1-liter polyethylene	HNO3 to pH < 2	180 days (Mercury 28 days) for analysis	Fill to neck of bottle	Federal Express Priority 1	Bubble Wrap or Foam Chips
Chloride, Sulfate Fluoride	One 500 ml polyethylene	Iced, 4° C	28 days for analysis	Fill to neck of bottle	Federal Express Priority 1	Bubble Pack or Foam Chips
Nitrate-Nitrogen	One 250 ml polyethylene	Iced, 4° C	48 hours for analysis	Fill to neck of bottle	Federal Express Priority 1	Bubble Pack or Foam Chips
Phenolics (total)	One 1-liter amber glass	H2SO4 to pH<2 Iced, 4° C	28 days for analysis	Fill to neck of bottle	Federal Express Priority 1	Bubble Pack or Foam Chips
TOC	One 250 ml polyethylene	HCl to pH<4 Iced, 4° C	28 days for analysis	Fill to neck of bottle	Federal Express Priority 1	Bubble Pack or Foam Chips
TOX	One 1-liter amber glass	H2SO4 to pH<2 Iced, 4° C	28 days for analysis	Fill completely, no air bubbles	Federal Express Priority 1	Bubble Pack or Foam Chips
Radium	One 1-liter polyethylene	HNO3 to pH<2	180 days for analysis	Fill to neck of bottle	Federal Express Priority 1	Bubble Pack or Foam Chips
Gross Alpha, Beta	One 1-liter polyethylene	HNO3 to pH<2	180 days for analysis	Fill to neck of bottle	Federal Express Priority 1	Bubble Pack or Foam Chips
Total Coliform	One sterile 500mL polyethylene	Iced, 4° C	30 hours for analysis	Fill to neck of bottle	Federal Express Priority 1	Bubble Pack or Foam Chips

Note:
(1) These are technical holding times and are based on time elapsed from time of sample collection.

CRA
CONESTOGA–ROVERS & ASSOCIATES
11100 METRO AIRPORT CENTER DRIVE
ROMULUS, MI. 48174 (313)942–0909

SHIPPED TO (Laboratory Name):

REFERENCE NUMBER:

SAMPLER'S SIGNATURE: _____ PRINTED NAME: _____

SEQ. No.	DATE	TIME	SAMPLE No.	SAMPLE TYPE	No. OF CONTAINERS	PARAMETERS	REMARKS
TOTAL NUMBER OF CONTAINERS						HEALTH/CHEMICAL HAZARDS	

RELINQUISHED BY: ① _____	DATE: TIME:	RECEIVED BY: ② _____	DATE: TIME:
RELINQUISHED BY: ② _____	DATE: TIME:	RECEIVED BY: ③ _____	DATE: TIME:
RELINQUISHED BY: ③ _____	DATE: TIME:	RECEIVED BY: ④ _____	DATE: TIME:

METHOD OF SHIPMENT: WAY BILL No.

White –Fully Executed Copy
Yellow –Receiving Laboratory Copy
Pink –Shipper Copy
Goldenrod –*Sampler Copy*

SAMPLE TEAM:
_____
_____

RECEIVED FOR LABORATORY BY:
_____
DATE:_____ TIME:_____

figure 5.1
CHAIN–OF–CUSTODY FORM
COMMERCIAL OIL SERVICES SITE
Oregon, Ohio

Two seals comprised of chain-of-custody tape will encompass the right and left sides of each shipping cooler prior to shipment to secure the lid and provide evidence that the samples have not been tampered with en route to the laboratory. Clear tape will be placed over the seals to ensure that they are not accidentally broken during shipment.

Upon receipt of the cooler at the laboratory, the cooler will be inspected by the Sample Custodian. The condition of the cooler and seal will be noted on the chain-of-custody form by the Sample Custodian.

The Sample Custodian then will check the contents of the cooler with those samples listed on the chain-of-custody form. Any damage to the samples or discrepancies in the accompanying documentation will be recorded in the remarks column of the chain-of-custody form, dated and signed. Any damage or discrepancies will be reported to the Project Manager who will contact the O&M Contractor for resolution.

5.3 SAMPLING PROTOCOLS

5.3.1 GROUNDWATER MONITORING WELL SAMPLING PROTOCOLS

Groundwater samples will be obtained using the sampling protocol which follows:

1) The depth of water in each well will be measured to the nearest 0.01 foot using an electric tape. The measuring device will be precleaned prior to use in each well using the cleaning sequence provided in Section 5.1.

2) Prior to sampling, each well will be purged using a low flow paristaltic pump. The monitoring wells will be purged by removing a minimum of three standing well volumes of groundwater where the volume of standing water is calculated as follows:

$$V = 0.041\ d^2\ h$$

where:

V = volume of standing water in gallons
d = diameter of the well in inches

h = depth of water in feet

Field measurements of pH, conductivity and temperature of the evacuated water will be obtained and recorded following removal of each standing well volume and prior to sample collection. Well purging will continue until three consecutive and consistent readings (± 0.2 units for pH, ± five percent for conductivity and ± two degrees for temperature) of pH, conductivity and temperature are obtained or a maximum of five standing well volumes have been removed. In the event that a well is pumped dry prior to achieving three well volumes, groundwater will be permitted to recover to a level sufficient for sample collection. The time that the well was pumped dry will be recorded and the well will be monitored for recovery. Upon recovery, the sample will be collected. All waste groundwater not collected for analysis will be disposed of as appropriate with state and federal regulations.

3) After purging the required volume of well water or immediately after well development, water samples will be collected through the dedicated teflon tubing attached to the peristaltic pump directly into the appropriate sample containers. Containers will be filled in order of decreasing analyte volatility, using techniques which will minimize sample agitation.

4) The protocols for placing samples in appropriate containers, preservation and shipping are included in Table 5.1.

5) A field duplicate sample will be collected at a frequency of one per ten or a minimum of one per sampling event. Sample and field duplicate containers will be filled alternately in order of decreasing volatility.

6) Samples for matrix spike analysis will be collected from a well representative of the condition of the majority of the monitoring wells, turbid or non turbid. Samples will be collected from the representative monitoring wells using the same protocol as for the field duplicate with increased sample volume being collected. The chain-of-custody forms sent to the project laboratory will indicate the samples collected for matrix spike analysis.

5.3.2 LEACHATE SAMPLING

Leachate samples from the leachate collection sump will be collected using the following sampling protocols:

i) the depth of water in the leachate collection sump will be measured to the nearest 0.01 foot using an electric tape. The measuring device will be cleaned prior to use using deionized water; and

ii) leachate samples will be collected using a precleaned, teflon or stainless steel bottom-filling bailer attached to nylon rope. The bailer will be emptied directly into the appropriate sample containers, where containers will be filled in order of decreasing analyte volatility, using techniques which will minimize sample agitation.

6.0 SAMPLE CUSTODY AND DOCUMENT CONTROL

Custody is one of several factors which is necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for evidence admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files. Final evidence files, including all original laboratory reports, are maintained under document control in a secure area.
A sample or evidence file is under your custody if it:

i) is in your possession;

ii) is in your view, after being in your possession;

iii) is in your possession and you place it in a secured location; or

iv) is in a designated secure area.

6.1 FIELD CHAIN-OF-CUSTODY PROCEDURES

The sample packaging and shipment procedures summarized below will insure that the samples will arrive at the laboratory with the chain-of-custody intact. The protocol for specific sample numbering using case numbers and traffic report numbers, if applicable, and other sample designations are included in Section 5.0.

6.1.1 FIELD PROCEDURES

The following chain-of-custody procedures will be used in the field:

1) The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. As few people as possible should handle the samples.

2) All bottles will be labeled with unique sample numbers.

3) Sample labels are to be completed for each sample using waterproof ink unless prohibited by weather conditions.

6.1.2 FIELD LOGBOOKS/DOCUMENTATION

Field logbook will provide the means of recording data collecting activities performed. As such, entries will be described in as much detail as possible so that persons going to the Site could reconstruct a particular situation without reliance on memory.

The title page of each logbook will contain the following:

i) person to whom the logbook is assigned;

ii) logbook number;

iii) project name;

iv) project start date; and

v) end date.

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, names of all sampling team members present, level of personal protection being used, and the signature of the person making the entry will be entered. The names of visitors to the Site, field sampling or investigation team personnel and the purpose of their visit will also be recorded in the field logbook.

Measurements made and samples collected will be recorded. All entries will be made in ink and no erasures will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark. Whenever a sample is collected, or a measurement is made, a detailed description of the location of the station, which includes compass direction and distance taken of the station, if any, will also be noted. All equipment used to make measurements will be identified, along with the data of calibration.

Samples will be collected following the sampling procedures presented in Section 5.0. The equipment used to collect samples will be noted, along with the time of sampling, sample description, depth at which the sample was collected, volume and number of containers. Sample identification number will be assigned during sample collection. Field QC samples, which will receive an entirely separate sample identification number, will be submitted blind to avoid laboratory bias of field QC samples.

6.1.3 TRANSFER OF CUSTODY AND SHIPMENT PROCEDURES

1) Samples will be accompanied by a properly completed chain-of-custody form. The sample numbers and locations will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to the laboratory, or to/from a secure storage area.

2) Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be secured with strapping tape and custody seals for shipment to the laboratory. The preferred procedure includes use of a custody seal attached to the front right and back left of the cooler. The custody seals are covered with clear plastic tape. The cooler is strapped shut with strapping tape in at least two locations.

3) Whenever samples are split with a source or government agency, a separate chain-of-custody record is prepared for those samples and marked to indicate with whom the samples are being split. The person relinquishing the samples to the facility or agency should request the representative's signature acknowledging sample receipt. If the representative is unavailable or refuses to sign, this is noted in the "Received By" space.

4) All shipments will be accompanied by the chain-of-custody record identifying the contents. The original record will accompany the shipment, and the pink and goldenrod copies will be retained by the sampler for returning to the sampling office.

5) If the samples are sent by common carrier, a bill of lading should be used. Receipts of bills of lading will be retained as part of the permanent documentation. Commercial carriers are not required to sign off on the custody form as long as the custody forms are sealed inside the sample cooler and the custody seals remain intact.

6.2 LABORATORY CHAIN-OF-CUSTODY PROCEDURES

The sample custodian will assign a unique number to each incoming sample for use in the laboratory. The unique number and customer number will then be entered into the sample receiving log. The laboratory date of receipt will also be noted.

Laboratory custody procedures and document control for those samples analyzed by the Project Laboratory will be consistent with their standard laboratory protocols.

6.3 STORAGE OF SAMPLES

After the sample custodian has prepared the sample receiving log, the chain-of-custody will be checked to ensure that all samples are stored in the appropriate locations. All samples will be stored within an access controlled location and will be maintained under the preservation requirements specified in Table 5.1 until completion of all analytical work or, as a minimum, for 30 days after receipt of the final report by the O&M Contractor.

6.4 FINAL EVIDENCE FILES CUSTODY PROCEDURES

Evidential files for the entire project will be maintained by the O&M Contractor's Project Manager and will consist of the following:

i) project plan;
ii) project log books;
iii) field data records;
iv) sample identification documents;
v) chain-of-custody records;
vi) correspondence;
vii) references, literature;
viii) final data packages;
ix) miscellaneous - photos, maps, drawings, etc.; and
x) final report.

The evidentiary file materials will be the responsibility of the evidentiary file custodian with respect to maintenance and document removal.

The laboratory will be responsible for maintaining analytical log books and laboratory data. Raw laboratory data files will be inventoried and maintained by the Project Laboratory for a period of five years, at which time the O&M Contractor will advise the laboratory regarding the need for additional storage.

7.0 CALIBRATION PROCEDURES AND FREQUENCY

This section describes procedures for maintaining the accuracy for all the instruments and measuring equipment which are used for conducting field tests and laboratory analyses. These instruments and equipment should be calibrated prior to each use or on a scheduled periodic basis.

7.1 FIELD INSTRUMENTS/EQUIPMENT

Instruments and equipment used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specification and the SOPs in Appendix A.

Equipment to be used during the field sampling will be examined to certify that it is in operating condition. This includes checking the manufacturer's operating manual for each instrument to ensure that all maintenance requirements are being observed. Field notes from previous sampling trips will be reviewed so that the notation on any prior equipment problem are not overlooked, and all necessary repairs to equipment have been carried out.

7.1.1 FIELD INSTRUMENT CALIBRATION

Calibration of the field instruments used during water sampling will be done prior to the collection of each water sample if data indicate a change (>±10 percent) in pH and/or conductivity from the last location sampled. Calibration of field instruments will be conducted at least daily during water sampling. The field equipment will be maintained, calibrated and operated in a manner consistent with the manufacturer's guidelines and the field SOPs in Appendix A.

7.2 LABORATORY INSTRUMENTS

Calibration of laboratory equipment will be based on approved written procedures. Records of calibration, repairs, or replacement will be filed and maintained by the

designated laboratory personnel performing quality control activities. These records will be filed at the location where the work is performed and will be subject to QA audit. For all instruments, the laboratory will maintain a properly trained repair staff with in-house spare parts or will maintain service contracts with vendors.

The records of calibration will be kept as follows:

1) If possible, each instrument will have record of calibration permanently affixed with an assigned record number.

2) A label will be affixed to each instrument showing description, manufacturer, model numbers, date of last calibration and by whom calibrated (signature), due date of next calibration and compensation or correction figures, as appropriate.

3) A written stepwise calibration procedure will be available for each piece of test and measurement equipment.

4) Any instrument that is not calibrated to within the manufacturer's original specification will display an appropriate warning tag.

Specific calibration procedures will be detailed in the respective methods and the associated SOPs to be provided upon selection of approved laboratory.

8.0 ANALYTICAL PROCEDURES

The samples collected for chemical analyses will be analyzed using the methods listed in Table 8.1. Laboratory SOPs will be reviewed and updated on a routine basis. Updated SOPs will be provided to the O&M Contractor as necessary.

TABLE 8.1

SUMMARY OF ANALYTICAL METHODS
COMMERCIAL OIL SERVICES SITE
OREGON, OHIO

Matrix	*Parameter*	*Preparation Method (1)*	*Method of Analysis (1)*
Groundwater	Chloride	SW-846 9251	SW-846 9251
	Iron	SW-846 3005/3010	SW-846 6010B
	Manganese	SW-846 3005/3010	SW-846 6010B
	Phenolics, total	SW-846 9065	SW-846 9065
	Sodium	SW-846 3005/3010	SW-846 6010B
	Sulfate	SW-846 9038	SW-846 9038
	TOC	SW-846 9060	SW-846 9060
	TOX	SW-846 9020	SW-846 9020
	Fluoride	EPA-WW 340.2	EPA-WW 340.2
	Nitrate-Nitrogen	EPA-WW 353.2	EPA-WW 353.2
	Arsenic	SW-846 3005A	SW-846 6010B
	Barium	SW-846 3005A	SW-846 6010B
	Cadmium	SW-846 3005A	SW-846-6010B
	Chromium	SW-846 3005A	SW-846 6010B
	Lead	SW-846 3005A	SW-846 6010B
	Mercury	SW-846 3005A	SW-846 7470A
	Selenium	SW-846 3005A	SW-846 6010B
	Silver	SW-846 3005A	SW-846 6010B
	Pesticides	SW-846 3510/3520	SW-846 8081A
	Herbicides	SW-846 3510C	SW-846 8151A
	Radium, total	SW-846 9315/9320	SW-846 9315/9320
	Gross Alpha & Beta	SW-846 9310	SW-846 9310
	Total Coliform	SW-846 9132	SW-846 9132
Leachate Water	To be determined based on the requirements of the receiving treatment facility.		

Notes:
(1) Methods:
SW-846 - "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, 3rd Edition, and Promulgated Updates, November 1986.
EPA-WW - "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, Revised March 1983
TOC - Total Organic Carbon
TOX- Total Organic Halides

9.0 INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

This section presents the internal quality control checks and frequency procedures which will be employed for field and laboratory measurements.

9.1 FIELD QC

Quality control procedures for field measurements will be limited to checking the reproducibility of the measurement in the field by obtaining multiple readings and by calibrating the instruments (where appropriate).

Quality control of field sampling will involve collecting field duplicates and field blanks in accordance with the applicable procedures and frequencies described in Sections 4.6 and 5.0, and the level of effort indicated in Table 2.1.

9.2 LABORATORY QC

Specific procedures related to internal laboratory QC samples (namely, matrix spikes, surrogate spikes, blanks, QC check samples and matrix spike duplicates) are detailed in the following subsections.

The internal QC checks for the methods of analyses will follow the appropriate methods specified in Table 8.1 and criteria outlined in the applicable SOPs.

9.2.1 CALIBRATION STANDARDS

All primary standard materials will be traceable to USEPA or NIST reference standards, if possible. Each calibration standard will receive a reference number that is traceable to the lot number from the primary reference standard from which it was prepared. The procedures for preparing calibration standards are contained within the applicable SOPs.

9.2.2 INSTRUMENT PERFORMANCE CHECKS - ORGANICS

The compliance requirements for satisfactory instrument performance are established to ensure that the instrument is capable of producing acceptable quantitative data. Instrument tuning for gas chromatography/mass spectrometry (GC/MS) methods of analysis ensure that adequate mass resolution and, to some degree, sensitivity are achieved. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an analysis run, while the continuing calibration checks document that the initial calibration is still valid, and that satisfactory maintenance and adjustment of the instrument on a day-to-day basis is achieved. The specific acceptance criteria and action requirements for these checks will be as specified by the respective methods presented in Table 8.1 and the SOPs.

9.2.3 INITIAL AND CONTINUING CALIBRATION CHECKS - METALS

The compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. The initial calibration and initial calibration verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of an analysis run, while the continuing calibration checks document that the initial calibration is still valid, and that satisfactory maintenance and adjustment of the instrument on a day-to-day basis is achieved. The specific control criteria and action requirements for these calibrations will be as specified in the SOPs.

9.2.4 INTERNAL STANDARD PERFORMANCE

The internal standard performance criteria ensure that the GC/MS and inductively coupled argon plasma/mass spectrometry (ICP/MS) sensitivities and responses are stable during every run. Acceptance criteria are as specified by the referenced analytical methods.

9.2.5 METHOD BLANK SAMPLES

A method blank sample will be analyzed by the laboratory at a frequency of one blank per 20 analyses or, in the event that an analytical round consists of less than 20 samples, one method blank sample will be analyzed. The method blank sample, an aliquot of analyte-free water, will be carried through the entire analytical procedure.

9.2.6 LABORATORY CONTROL SAMPLES (LCS)

Laboratory control samples serve as a monitor of the overall performance of all steps in inorganic analysis, including the efficiency of the digestion procedure. The criteria used to evaluate the LCS data will be as specified in the referenced method and SOP.

9.2.7 MATRIX SPIKE/MATRIX SPIKE DUPLICATES - ORGANIC ANALYSES

A matrix spike and matrix spike duplicate (MS/MSD) sample set will be analyzed at a minimum frequency of one per 20 investigative samples. Acceptance criteria and compounds that will be used for matrix spikes are identified in the applicable SOPs. Percent spike recoveries will be used to evaluate analytical accuracy while percent difference between the matrix spike and matrix spike duplicate will be used to assess analytical precision.

9.2.8 MATRIX SPIKE/DUPLICATES - INORGANIC ANALYSES

A Matrix Spike/Laboratory Duplicate (MS/DUP) for inorganic sample sets will be analyzed at a minimum frequency of one per 20 investigative samples or one per sample batch. Acceptance criteria and compounds that will be used for matrix spikes are identified in the applicable laboratory's SOPs. Percent spike recoveries will be used to evaluate analytical accuracy while percent difference between the investigative sample and laboratory duplicate will be used to assess analytical precision.

9.2.9 SURROGATES

Surrogates are used in all GC and GC/MS analyses. Every blank, standard, and environmental sample including MS/MSD samples will be spiked with surrogate compounds prior to purging volatiles or extracting semi-volatiles.

Surrogates will be spiked into samples according to the appropriate analytical methods. Surrogate spike recoveries will fall within the control limits set by procedures specified in the SOP. The control limits are presented in the applicable SOP for analytes falling within the quantitation limits without dilution. Dilution of samples to bring the analyte concentration into the linear range of calibration may dilute the surrogates out of the quantitation limit; assessment of analytical quality in these cases will be based in the quality control embodied in the check, matrix spike and matrix spike duplicate samples.

9.2.10 REAGENT CHECKS

Reagents prepared for instrumental methods of analysis will be monitored by method blank samples and QC check samples, where appropriate.

9.2.11 QC CHECK SAMPLES

QC check samples will be analyzed to determine the accuracy of the analytical methods. QC check samples are generally prepared from standards that are from a different source than the calibration standards or a standard reference materials. The percent recoveries will be calculated and computed to the acceptance criteria in the laboratory's SOPs.

9.2.12 ICP INTERFERENCE CHECK SAMPLES (ICS)

To verify that proper interelement and background correction factors have been established by the laboratory, the laboratory must analyze an ICS prior to and after each analytical sequence run. Percent recovery criteria of the ICS data will be as specified in the referenced method and SOP.

9.2.13 ICP SERIAL DILUTION

ICP serial dilution analysis is used to determine whether significant chemical or physical interference exists due to the sample matrix. The criteria used to evaluate the ICP serial dilution will be as specified in the laboratory's SOP.

9.2.14 ICP AND ICP/MS QC ANALYSIS

The QC scheme used to assess the precision and accuracy of the individual analytical determinations relative to the overall ICP, ICP/MS method precision and accuracy will consist of post-digestion analytical spikes when Matrix Spike fail acceptance criteria. The criteria used to evaluate the ICP, ICP/MS QC scheme will be as specified in the referenced method and SOP.

9.2.15 BLIND CHECK SAMPLES

As supplied by the USEPA, an analytical batch may contain a blind check sample. In general, the blind check sample may be obtained from USEPA and supplied to the O&M Contractor. The analytes employed in this check sample will be a representative subset of the analytes of interest.

The percent recovery of analytes from the check samples will be calculated as defined in Section 13.1.

10.0 DATA REDUCTION, VALIDATION AND REPORTING

The Project Laboratory will perform analytical data reduction and review in-house under the direction of the Project Laboratory QA Officer. The Project Laboratory QA Officer will be responsible for assessing data quality and advising of any data which were rated "preliminary" or "unacceptable" or other qualifications based on the established QC criteria. Data reduction, review and reporting by the Project Laboratory shall be conducted as detailed in the following procedure:

1) Raw data produced and checked by the responsible analyst is turned over for independent review by another analyst.

2) The area supervisor or senior analyst reviews the data for attainment of quality control criteria and presented in the referenced analytical methods.

3) The area supervisor or senior analyst will decide whether any sample reanalysis is required. It should be noted that reanalyses required during corrective action procedures may be initiated by the responsible analyst as described in Section 14.0.

4) Upon completion of all reviews and acceptance of the raw data by the supervisor, a report will be generated and sent to the Project Manager.

5) The Project Manager will complete a thorough inspection of all reports.

6) Upon acceptance of the preliminary reports by the Project Manager, final reports will be generated and signed by the Operations Manager or his designee.

7) A thorough review of a percentage of all data packages is performed by the Project Laboratory Quality Assurance Officer or his designee.

Field data from direct-reading instruments (pH, conductance, temperature) will not require reduction. Laboratory data reduction will be performed using the equations in the analytical methods referenced in Table 8.1.

The QA/QC Officer - Analytical and Field Activities will conduct an evaluation of data reduction and reporting by the laboratory. These evaluations will consider the finished data sheets, field blank data and recovery data for surrogate and matrix spikes. The material will be checked for legibility, completeness, correctness and the presence of requisite dates, initials, and signatures. The results of these checks will be assessed and reported to the O&M Contractor's Project Manager noting any discrepancies and their

effect upon the acceptability of the data. All information garnered for QA/QC checks will be discussed in a QA/QC Validation report.

Validation of the analytical data will be performed by the QA/QC Officer - Analytical and Activities based on the applicable evaluation criteria outlined in "National Functional Guidelines for Organic Data Review", February 1994 and "National Functional Guidelines for Inorganic Data Review", February 1994. The assessment of analytical and field data will include checks for adherence to laboratory QA procedures and accuracy and precision criteria; and the presence of transmittal errors and anomalously high or low parameter values. The results of these data validations will be reported to the Project Manager, noting any problems and their effect upon the acceptability of the data.

Data produced from field measurements and sample collection activities that are used in the project reports will be appropriately identified and appended to the report. Where data have been reduced or summarized, the method of reduction will be documented in the report. In addition, field data will be audited by the QA/QC Officer Field Activities for anomalously high or low values that may appear to be inconsistent with other data.

Laboratory data packages for chemical analyses will be consistent with the following where applicable for all analyses:

i) a case narrative that includes a summary of analytical methods used and a description of any unusual action or conditions;

ii) dates of sample receipt, extraction/digestion and analysis;

iii) laboratory and field sample identification numbers;

iv) samples results and quantitation limits of all analyses in a tabular format;

v) method blank sample summaries;

vii) MS/MSD and/or MS/DUP recovery and RPD data and control limits;

viii) check sample data; and

ix) executed chain-of-custody forms.

In addition to the general deliverables, specific deliverables for organic and inorganic analysis may consist of the following:

1. Organics
   - i) system monitoring compound (surrogates) recovery data and control limits;
   - ii) GC/MS instrument performance check;
   - iii) initial and continuing calibration data;
   - iv) internal standard area and retention time summary;
   - v) analyte resolution summary; and
   - vi) analysis run sequence.

2. Inorganics
   - i) initial and continuing calibration verification data;
   - ii) ICP interference check sample data;
   - iii) ICP serial dilutions;
   - iv) preparation log; and
   - v) analysis run log.

11.0 PERFORMANCE AND SYSTEM AUDITS

Performance and system audits of both field and laboratory activities may be conducted to verify that sampling and analysis are performed in accordance with the procedures established in the QAPP. The audits of field and laboratory activities include two separate independent parts; internal and external audits.

11.1 FIELD AUDITS

Internal audits of field activities (sampling and measurements) will be conducted by the O&M Contractor QA/QC Officer - Analytical and Field Activities. The audits will include examination of field sampling records, field instrument operating records, sample collection, handling and packaging in compliance with the established procedures, maintenance of QA procedures, chain-of-custody, etc. These audits will be conducted to correct deficiencies, and to verify that QA procedures are maintained throughout the remediation. The audits will involve review of field measurement records, instrumentation calibration records and sample documentation.

Any external audits will be conducted by USEPA Region V.

11.2 LABORATORY AUDITS

The internal performance and system audits of the laboratory may be conducted by the laboratory's QA officer will include examination laboratory documentation of sample receiving, sample log-in, sample storage, chain-of-custody procedure, sample preparation and analysis, instrument operating records, etc. The performance audits may be conducted on a quarterly basis. Blind QC samples may be prepared and submitted along with project samples to the laboratory for analysis throughout the project. The QA officer will evaluate the analytical results of these blind performance samples to ensure the laboratory maintains acceptable performance.

Any external audits of the laboratories will be conducted by USEPA Region V.

12.0 PREVENTIVE MAINTENANCE

All analytical instruments to be used in this project will be serviced by the laboratory personnel at regularly scheduled intervals in accordance with the manufacturers recommendations. Instruments may also be serviced at other times due to failure. Requisite servicing beyond the abilities of the laboratory personnel will be performed by the equipment manufacturer or its designated representative.

Daily checks of each instrument will be by the analyst who has been assigned responsibility for that instrument. This will include changing gas chromatography instrumentation inlet liners, tuning gas chromatography/mass spectrometry instrumentation, checking operation of data systems, checking for leaks, etc. Manufacturer's recommended procedures will be followed in every case.

Table 12.1 presents routine preventive maintenance for laboratory field instruments.

TABLE 12.1

ROUTINE PREVENTIVE MAINTENANCE
PROCEDURES AND SCHEDULES
COMMERCIAL OIL SERVICES SITE
OREGON, OHIO

Instrument	*Maintenance Procedures/Schedule*	*Spare Parts in Stock*
Gas Chromatograph/Mass Spectrometer (GC/MS)	1. Replace pump oil as needed. 2. Change septa weekly or as often as needed. 3. Change gas line dryers as needed. 4. Replace electron multiplier as often as needed. 5. Replace gas jet splitter as needed. 6. Replace GC injector glass liner weekly or as often as needed. 7. Replace GC column as needed. 8. Check to ensure that gas supply is sufficient for the day's activity, and the delivery pressures are set as described in the SOP. 9. Check to ensure the pressure on the primary regulator never run below 100 psi.	1. Syringes 2. Septa 3. Various electronic components 4. Glass jet splitter 5. GC column 6. Glass liner
Gas Chromatograph	1. Change septa weekly or as often as needed. 2. Change gas line dryers as needed. 3. Replace GC injector glass liner weekly or as often as needed. 4. Replace GC column as needed. 5. Clean/replace GC detector as needed. 6. Check to ensure that gas supply is sufficient for the day's activity, and the delivery pressures are set as described in the SOP. 7. Check to ensure the pressure on the primary regulator never run below 100 psi.	1. Syringes 2. Septa 3. Detectors 4. Glass liner 5. GC column

TABLE 12.1

ROUTINE PREVENTIVE MAINTENANCE PROCEDURES AND SCHEDULES COMMERCIAL OIL SERVICES SITE OREGON, OHIO

Instrument	*Maintenance Procedures/Schedule*	*Spare Parts in Stock*
Purge and Trap Sample Concentrator	1. Replace trap as needed. 2. Decontaminate the system after running high concentration samples or as required by blank analysis. 3. Leak check system daily and as often as needed. 4. Check to ensure the gas supply is sufficient for the day's activity, and the delivery pressures are set as described in the SOP. 5. Check to ensure the pressure on the primary regulator never runs below 100 psi.	1. Spare traps 2. Spare sparger 3. Various electronic components/ circuits 4. Plumbing supplies - tubing fitting
Mercury Analyzer	1. Clean tubing and quartz cell weekly or as often as needed. 2. Clean aspirator after each batch samples or as necessary. 3. Check daily to ensure the gas supply is sufficient for the day's activity, and the delivery pressures are set as described in the SOP.	1. Quartz cells 2. Aspirator
Inductively Coupled Plasma Spectrometer (ICP)	1. Clean torch assembly and mixing chamber when discolored or after eight hours of running high dissolved solid samples. 2. Clean nebulizer as needed. 3. Check daily to ensure the gas supply is sufficient for the day's activity pressures are set as described in the SOP.	1. Spare torch and mixing chambers 2. Spare nebulizer 3. Spare capillary tubing.

TABLE 12.1

ROUTINE PREVENTIVE MAINTENANCE
PROCEDURES AND SCHEDULES
COMMERCIAL OIL SERVICES SITE
OREGON, OHIO

Instrument	*Maintenance Procedures/Schedule*	*Spare Parts in Stock*
ICP/Mass Spectrometer (MS)	1. change the peristaltic pump tubing 2. Inspect the sampler and skimmer cones for cleanliness, clean if necessary. 3. check the vacuum system oil levels 4. Rinse nebulizer with 1% HNO_3 for five minutes 5. Clean torch assembly and mixing chamber when discolored	1. Peristaltic pump tubing 2. Spare torch and mixing chambers 3. Spare nebulizer 4. Spare capillary tubing
Technicon TRAACS-800 Autoanalyzer	1. Inspect pump tubes after each 8-hour run; replace if discolored or distorted. 2. Check daily to ensure the gas supply is sufficient for the day's activity, and the delivery pressures are set as described in the SOP.	1. Pump tubes 2. Colorimeter lamps
pH Meter	1. Check battery (if used in field); and replace if discharged. 2. After use in samples containing free oil, wash the electrode in soap and rinse thoroughly with water. Immerse the lower third of the electrode in diluted HCl (1:9) solution for 10 minutes to remove any film formed. Rinse thoroughly with water. 3. Keep electrode properly filled with appropriate filling electrolyte solution.	1. Standard buffers 2. Electrolyte filling solution 3. Spare electrode
Specific Conductivity Meter	1. Check battery (if used in field); and replace if discharged. 2. After use in samples containing free oil, wash the electrode in soap and rinse thoroughly with water.	1. Standard solution 2. Spare electrodes

13.0 SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY AND COMPLETENESS

The following sections include the procedures and formulae utilized to assess the levels of precision, accuracy, and completeness achieved during the associated sample analyses.

13.1 ACCURACY ASSESSMENT

In order to ensure the accuracy of the analytical procedures, an environmental sample will be designated by the sampler, or a sample will be randomly selected by the laboratory, and spiked with a known amount of the analyte or analytes to be evaluated. In general, a sample spike will be included in and analyzed with every batch of 20 samples analyzed on each instrument. The analyte concentration in the spiked sample compared to the analyte concentration in the unspiked sample will be used to determine percent recovery. The percent recovery (%R) for a spiked sample is calculated according to the following formula:

$$\%R = \frac{\text{Amount in Spiked Sample} - \text{Amount in Sample}}{\text{Known Amount Added}} \times 100$$

Percent recovery control charts for each spiked analyte will be maintained on a matrix-specific basis.

13.2 PRECISION ASSESSMENT

MS/MSD samples are prepared by choosing a designated sample or a sample at random from each sample shipment received at the laboratory, dividing the sample into equal aliquots, and spiking each of the aliquots with a known amount of analyte. The duplicate spiked sample is then included in the analytical sample batch. The analysis of MS/MSD samples provides information regarding the precision of the preparation and analytical techniques. The RPD of the MS and MSD will be calculated and plotted on control charts. The RPD is calculated using the following formula:

$$RPD = \frac{|\text{Amount in Spike 1} - \text{Amount in Spike 2}|}{0.5(\text{Amount in Spike 1} + \text{Amount in Spike 2})} \times 100$$

The RPDs for laboratory duplicates are determined similarly, but the samples are not spiked prior to analysis.

13.3 COMPLETENESS ASSESSMENT

Completeness is the number of valid sample results compared to the total number of sample results of a specific matrix analyzed using a specific method. Following completion of the analytical testing, the percent completeness will be calculated using the following equation:

$$\text{Completeness} = \frac{(\text{Number of Valid Measurements})}{(\text{Number of Measurements Planned})} \times 100$$

14.0 CORRECTIVE ACTION

Corrective action is the process of identifying, recommending, approving and implementing measures to counter unacceptable procedures or out of quality control performance which can affect data quality. Corrective action can occur during field activities, laboratory analyses and data validation and assessment. All corrective action proposed and implemented will be documented.

14.1 FIELD CORRECTIVE ACTION

Corrective action in the field may be necessary when the sample network is changed (i.e. more/less samples, sampling locations other than those specified in the QAPP), sampling procedures and/or field analytical procedures require modification, due to unexpected conditions. USEPA will be notified of any field changes. In general, the field sampling team may identify the need for corrective action. The field sampling team, in consultation with the QA/QC Officer - Analytical and Field Activities, will recommend a corrective action. The QA/QC Officer - Analytical and Field Activities will approve the corrective action which will be implemented by the field team. It will be the responsibility of the QA/QC Officer - Analytical and Field Activities to ensure the corrective action has been implemented.

Corrective action resulting from internal field audits will be implemented immediately if data may be adversely affected due to unapproved or improper use of approved methods. The QA/QC Officer - Analytical and Field Activities will identify deficiencies and recommended corrective action to the Project Manager. Implementation of corrective actions will be performed by the QA/QC Officer - Analytical and Field Activities and field team. Corrective action will be documented in quality assurance reports to management.

14.2 LABORATORY CORRECTIVE ACTION

Corrective action in the laboratory may occur prior to, during and after initial analyses. A number of conditions such as broken sample containers, multiple phases, low/high pH readings, potentially high concentration samples may be identified during sample log-in or just prior to analysis. Following consultation with analysts and section leaders,

it may be necessary for the laboratory QA Officer to approve the implementation of corrective action. The submitted SOPs specify some conditions during or after analysis that may automatically trigger corrective action or optional procedures. These conditions may include dilution of samples, additional sample extract cleanup or automatic reinjection/reanalysis when certain QC criteria are not met.

The calibration acceptance/rejection criteria presented in the SOPs presents examples of situations requiring corrective action for each analytical instrument. In addition, the laboratory's SOPs will provide a section on corrective action requirements.

The bench chemist will identify the need for corrective action. The Operations Manager or section leaders, in consultation with the laboratory supervisor and staff, will approve the required corrective action to be implemented by the laboratory staff. The laboratory QA Officer will ensure implementation and documentation of the corrective action.

These corrective actions are performed prior to release of the data from the laboratory. The corrective action will be documented in both the laboratory's corrective action report and the case narrative report sent from the laboratory.

The need for corrective action may also be identified during systems or performance audits. In these cases, the need for corrective action will be identified by the auditor and the corrective action taken to resolve the problem will be documented by the laboratory QA Manager. The corrective action taken will depend upon the QA/QC criteria which was violated. All problems requiring corrective action and the corrective action taken will be reported to the laboratory Project Manager.

14.3 CORRECTIVE ACTION DURING DATA VALIDATION AND DATA ASSESSMENT

The QA/QC Officer - Analytical and Field Activities may identify the need for corrective action during either the data validation or data assessment. Potential types of corrective action may include resampling by the field team or re-injection/reanalysis of samples by the laboratory.

These actions are dependent upon the ability to mobilize the field team, whether the data to be collected is necessary to meet the required quality assurance objectives (e.g.

the holding time for samples is not exceeded). When the QA/QC Officer - Analytical and Field Activities identifies a corrective action situation, the O&M Contractor's Project Manager will be responsible for approving the implementation of corrective action, including resampling, during data assessment.

15.0 QUALITY ASSURANCE REPORT TO MANAGEMENT

Management (including USEPA) will receive reports on the performance of the measurement system and data quality following each sampling round and on an annual basis.

Minimally, these reports will include:

i) assessment of measurement quality indicators, i.e., data accuracy, precision and completeness;

ii) results of system audits; and

iii) QA problems, action taken and resolutions.

The QA/QC Officer - Analytical and Field Activities will be responsible within the organizational structure for preparing these reports. The final report for the project will also include a separate QA section which will summarize data quality information contained in the periodic QA/QC reports to management, and details an overall data assessment and validation in accordance with the data quality objectives outlined in this QAPP.

APPENDIX A

FIELD STANDARD OPERATING PROCEDURES

PROCEDURES FOR MEASURING pH

1.0 CALIBRATION PROCEDURE

The pH meter will be calibrated daily.

1. Switch the unit on by pressing the ON/OFF key.

2. Immerse the electrode in a pH 7 buffer. Stir gently and wait for approximately 20 seconds.

3. Press "CAL" button, display will blink.

4. When reading stabilizes, press "HOLD/CON" button. This will calibrate meter to pH 7.0. Display wills stop blinking.

5. If an error message appears, the calibration was not performed correctly. Try using fresh pH solution, changing batteries, or replacing pH sensor, if applicable.

6. Rinse electrode in water and repeat steps for pH 4.0 and/or pH 10.0 buffer solutions.

7. Rinse electrode in distilled/deionized water and then immerse probe in pH 7.0 solution again to check calibration.

8. Rinse electrode with distilled/deionized water. The meter is calibrated and ready for use.

2.0 OPERATION PROCEDURE

1. Calibrate pH meter.

2. Rinse probe in distilled/deionized water.

3. Fill plastic disposable beaker with water from the sample.

4. Insert probe into sample beaker. Stir gently and wait for approximately 20 seconds and obtain a reading. The meter will read between 0 and 14, in 0.1 increments.

5. Log results in field notebook.

6. Rinse probe off in distilled/deionized water.

7. If the electrodes become coated with foreign compounds, the probe should be cleaned with a detergent solution and then rinsed with distilled/deionized water.

3.0 MAINTENANCE PROCEDURE

1. Rinse probe free of white crystals or dirt with water.

2. Replace batteries on a regular basis.

3. When batteries are low, the unit will display an error message. Remove the cover with its O-ring and replace all batteries paying attention to their polarity. Reinsert the cover with the O-ring and close. Recalibrate the instrument..

4. Keep records of usage, maintenance, calibration, problems, and repairs.

5. A replacement meter will be available onsite or ready for overnight shipment.

6. Store electrode in wet, protective cap.

7. pH meter will be sent back to manufacturer for service when needed.

4.0 QUALITY CONTROL

1. Duplicate 1 out of 10 samples. If less than 10 samples are analyzed, a duplicate is still required. Duplicates must be ±0.2 pH units.

   If the results are outside of the control limits, rinse electrodes and repeat analysis. If results are still outside of the control limits, recollect samples and repeat analysis. If the results are still outside of the control limits, check calibration and recalibrate if necessary (see item 2, below). If drift is suspected to be the cause of the problem, clean the electrode and recalibrate. If drift is still apparent, replace electrode.

2. Calibration check results must be ±0.10 pH unit of the true value. If the result is outside of ±0.10 pH unit, rinse electrodes and check solution again. If still outside the control limit, recalibrate the meter and reanalyze all samples analyzed since the last in-control calibration.

PROCEDURES FOR MEASURING CONDUCTIVITY

Conductivity is the ability of a solution to pass an electric current. This current is carried by inorganic dissolved solids. The measure of conductivity is useful to relate the chemical purity of the water and the amount of dissolved solids in a solution.

1.0 CALIBRATION PROCEDURE

The conductivity meter will be calibrated daily.

1. Immerse tip in calibration solution for 20 seconds or until reading stabilizes.
2. Turn adjusting screw until proper reading is displayed.
3. Remove from calibration solution, rinse, and cap meter.
4. Always used pre-approved calibration solution

2.0 OPERATION PROCEDURE

1. Calibrate meter.
2. Rinse probe in distilled/deionized water.
3. Fill plastic disposable beaker with water from the sample.
4. Insert probe into sample beaker. Stir gently and wait for approximately 20 seconds and obtain a reading.
5. Log results in field notebook.
6. Rinse probe off in distilled/deionized water.
7. If the electrodes become coated with foreign compounds, the probe should be cleaned with a detergent solution and then rinsed with distilled/deionized water.

3.0 MAINTENANCE PROCEDURE

1. Replace batteries on a regular basis.
2. Store electrode in wet, protective casing when not in use.

3. Keep records of usage, maintenance, calibration, and of any problems and repair.

4. A replacement meter will be available on-site or ready for overnight shipment.

5. Conductivity meter will be sent back to manufacturer for service when needed.

4.0 QUALITY CONTROL

1. The quality control calibration check standard must be analyzed daily. The standard must be within ±10 percent of the true value or the samples run after the last acceptable check standard are to be reanalyzed. Record the calibration standard in the field logbook.

2. Duplicate a minimum of 1 out of 10 samples. If less than 10 samples are analyzed, a duplicate is still required. Duplicate values are to be within ±15% of each other. If outside of this range, reanalyze the samples. If still outside the acceptance range, recollect sample and reanalyze. If still out, replace probe.

PROCEDURES FOR MEASURING TEMPERATURE

Temperature readings will be taken at each water sampling location to assist in pH and conductivity measurement. It will also assist in chemical and biological interpretations.

1.0 CALIBRATION PROCEDURE

1. There is no calibration procedure for this piece of equipment

2.0 OPERATION PROCEDURE

1. Rinse thermometer in distilled/deionized water.
2. Immerse thermometer in the water sample and read it to the nearest degree Celsius (°C) of Fahrenheit (°F).
3. Record reading in the field notebook or relevant log.

3.0 PREVENTATIVE MAINTENANCE

1. Replace batteries on a regular basis.
2. Store in protective casing when not in use.
3. Keep records of usage, maintenance, calibration, problems, and repairs.
4. A replacement meter will be available onsite or ready for overnight shipment.
5. Annually, check instrument against thermometer that has been manufactured to a National Standard or equivalent. Temperature reading should be within ±3 °C or ±5.4 °F.

4.0 QUALITY CONTROL

1. Duplicate 1 out of 10 samples. If less than 10 samples are analyzed, a duplicate is still required. Duplicates must be ±1 degree Celsius.

   If the results are outside of the control limits, rinse electrode and repeat analysis. If results are still outside of the control limits, recollect samples and repeat analysis. If the results are still outside of the control limits, check calibration and recalibrate if necessary (see item 2, below). If drift is suspected to be the cause of

the problem, clean the electrode and recalibrate. If drift is still apparent, replace electrode.

2. Calibration check results must be ± 1 degree Celsius of the true value. If the result is outside, rinse electrode and check solution again. If still outside the control limit, recalibrate the meter and reanalyze all samples analyzed since the last in-control calibration.

APPENDIX C

HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN

FINAL OPERATION AND MAINTENANCE PLAN
LAGOON CLOSURE REMOVAL ACTION
COMMERCIAL OIL SERVICES SITE
OREGON, OHIO

Prepared By:

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1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been prepared as part of the Operation and Maintenance Plan (O & M Plan) for the Commercial Oil Services (COS) Site (Site) in Oregon, Ohio. The location of the Site is presented on Figure 1.1. The Site plan is presented on Figure 1.2. The project involves field activities which may include the following:

1) leachate monitoring, sampling, and removal;
2) groundwater sampling; and
3) Site inspection and maintenance activities, such as inspecting condition of landfill cap and grounds surrounding the area, repairing fencing, and mowing grass.

This HASP is designed to ensure:

1) that personnel working on the Site are not exposed to hazardous activities or materials which could adversely affect their health and safety;
2) that the health and safety of the general public and the environment is not compromised by the migration of impacted materials off the Site; and
3) compliance with applicable governmental and non-governmental [American Conference of Governmental Industrial Hygienists (ACGIH)] regulations and guidelines.

All Site operations will be conducted in accordance with the provisions of the HASP. Cost and scheduling considerations will not be considered as justification for modifying this plan.

2.0 BASIS

The Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29, Code of Federal Regulations, Parts 1910 and 1926 (29 CFR 1910 and 1926) will provide the basis for this HASP. The plan also reflects the position of the United States Environmental Protection Agency (USEPA) and the National Institute for Occupational Safety and Health (NIOSH) regarding procedures required to ensure safe operations at sites containing hazardous or toxic materials.

3.0 ENVIRONMENTAL CONDITIONS

At the Commercial Oil Services Site, Lagoon Closure activities will result in a landfill consisting of one containment cell. The landfill will contain solidified/stabilized sludges, contaminated soils, and debris from the removal of tanks and structures and closure of lagoons at the Site. The proposed locations of the landfill, leachate collection sump, and monitoring wells are presented on Figure 1.2.

Potential Constituents of Concern (PCOCs) contained in the landfilled materials include volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), lead, and PCBs.

The routes of entry causing primary concern with these constituents are through skin adsorption, ingestion, and inhalation.

An analysis of potential hazards associated with proposed activities on the Site is presented in Table 3.1

4.0 RESPONSIBILITIES AND ADMINISTRATION

Selected operation and maintenance contractors will designate an individual working on the Site to act as the Health and Safety Officer (HSO). The HSO, will be responsible for decisions regarding when work will be stopped or started for health and safety considerations. Specifically, the HSO will be responsible for the following:

1) implementation of a project-specific HASP at the initiation of the activities, and daily enforcement and monitoring of the HASP for duration of activities; and
2) a training session of all personnel working on the Site with regard to a project specific HASP and other safety requirements to be observed during field activities, including:
   a) potential hazards;
   b) personal hygiene principles;
   c) use of personal protective equipment (PPE); and
   d) emergency procedures for dealing with fire and medical situations.

The HSO will:

1) be responsible for the maintenance and separation of the "Exclusion" (potentially impacted) and "Support" (not impacted) areas as described in Section 6.0;
2) be responsible for the supervision and inspection of equipment cleaning; and
3) be responsible for the coordination of emergency procedures.

5.0 PROJECT-SPECIFIC HEALTH AND SAFETY PLAN

A project-specific HASP will be prepared and executed by the selected Contractor as necessary for operation and maintenance work performed on the Site. The project-specific HASP will address, at minimum, all the requirements outlined in this HASP. A copy of this HASP and any project-specific HASP will be maintained on the Site during all operation and maintenance activities.

6.0 WORK AREAS

Specific work areas will be delineated as outlined below:

a) Exclusion Zone (EZ) - This zone will include all areas where leachate sampling/removal or groundwater sampling is being conducted, and will encompass a circle 50 feet in diameter around the manhole or monitoring well; and

b) Support Zone (SZ) - This area is the portion of the Site defined as the area outside the Exclusion Zone. The function of the Support Zone includes:

   1) an entry area for personnel, material and equipment to the Site; and

   2) a storage area for clean safety and work equipment.

7.0 MEDICAL SURVEILLANCE

In accordance with requirements detailed in 29 CFR 1910.120 and 29 CFR 1910.134, all personnel on the Site who may come in contact with potentially impacted materials will have received, within one year prior to starting field activities, medical surveillance by a licensed physician or physician's group.

Medical records for all sampling personnel will be maintained by their respective employers. The medical records will detail the tests that were taken and will include a copy of the consulting physician's statement regarding the tests and the employee's suitability for work.

Each employer will ensure that its personnel involved in work conducted on the Site will have all necessary medical examinations prior to commencing work which requires respiratory protection or exposure to hazardous materials. Personnel not obtaining medical certification will not perform work within impacted areas.

Interim medical surveillance will be completed if an individual exhibits poor health or high stress responses due to activities conducted on the Site or when accidental exposure to elevated concentrations of contaminants occurs.

8.0 TRAINING

All project personnel will be required to complete appropriate training and refresher sessions conducted by the HSO. Training and refresher sessions are designed to ensure that all personnel are capable of and familiar with the use of safety, health, respiratory and protective equipment and with the safety and security procedures required for this project.

In accordance with 29 CFR 1910.120, all employees exposed to hazardous substances, health hazards or safety hazards will receive training including a minimum of 40 hours instruction, as required by OSHA, and three days of actual field experience under direct supervision. The Contractor will provide documentation stating that all personnel working on the Site have complied with this regulation. Each individual's name will be included on this confirmatory letter. The training program will include at a minimum the following items:

1) personnel responsible for health and safety;
2) project-specific potential hazards;
3) use of personal protective equipment, including proper donning and doffing procedures;
4) work practices by which the employee can minimize risks from these potential hazards;
5) safe use of engineering controls and equipment;
6) discussion and completion of medical surveillance requirements and recognition of symptoms associated with exposure to hazards;
7) contaminant migration control methods (described in Section 13.0);
8) decontamination procedures;
9) project specific standard operating procedures;
10) delineation between work zones;
11) scope of the intended works for the project; and
12) review communications and appropriate hand signals between personnel working in the EZ.

The HSO will be responsible for ensuring that personnel not successfully completing the required training prior to beginning work are not permitted to enter the Site to perform work.

The Contractor will implement a hazard communication ("Right-to-Know") program in accordance with 29 CFR 1910.1200.

9.0 PERSONAL PROTECTIVE EQUIPMENT

All personnel working on the Site will be equipped with personal protective equipment (PPE) and protective clothing appropriate for the material being handled and the nature of work being completed. All PPE and protective clothing will be kept clean and well-maintained.

PPE and apparel as required for general work and work within the Exclusion Zone will be level D:

1) inner gloves, thin nitrile or latex, when performing groundwater or leachate-related activities;
2) steel toed, steel shank chemical resistant work boots;
3) work clothing (full length pants, long sleeve shirts);
4) hardhats, if overhead hazards exist; and
5) safety glasses with sideshields, when performing groundwater or leachate-related activities.

Additional protective equipment usage guidelines to be implemented include:

1) all prescription eyeglasses in use on the Site during operation and maintenance activities will be safety glasses. Contact lenses will not be permitted;
2) footwear used on the Site will be work boots, and may be covered by rubber overboots when entering or working in the EZ;
3) personnel unable to pass a respirator fit test will not enter or work in the EZ;
4) all personnel will wear an approved hardhat when present in the EZ if overhead hazards are present or when intrusive activities involving powered equipment are conducted; and
5) all PPE worn on the Site will be discarded or decontaminated (as appropriate) at the end of each work day. The HSO will be responsible for ensuring individuals decontaminate PPE before reuse.

10.0 PERSONAL HYGIENE

The HSO will be responsible for ensuring that all personnel performing or supervising operation and maintenance activities within a hazardous work area, or who may potentially be exposed to impacted materials, observe and adhere to the personal hygiene-related provisions of this section.

Personnel found to be disregarding the personal hygiene-related provisions of this plan will be barred from the Site.

The following equipment/facilities will be provided for the personal hygiene of all personnel working on the Site:

1) suitable disposable outerwear, gloves, and footwear on a daily or as-needed basis; and
2) contained storage for used disposable outerwear.

The following regulations for personnel working within the EZ will also be enforced:

1) used disposable outerwear, if used, will not be reused, and when removed, will be placed inside disposable containers provided for that purpose;
2) smoking, eating and drinking will be prohibited except in designated areas; and
3) personnel will thoroughly cleanse their hands and other exposed areas before smoking, eating or drinking in a designated area, or before leaving the Site.

11.0 EMERGENCY AND FIRST AID EQUIPMENT

The safety equipment listed below will be available on the Site during operation and maintenance activities:

1) portable emergency eye wash;
2) 20-pound ABC type dry chemical fire extinguisher;
3) fire blanket; and
4) first aid kit.

12.0 CONTINGENCY AND RESPONSE PLAN

In the event of injury to personnel working on the Site, the following protocols will be followed:

1) in the event of injury, notify the HSO, and the Engineer;
2) contact the closest medical center and describe the injury;
3) decontaminate personnel and administer appropriate emergency first aid; and
4) transport personnel to the defined medical facility along a predefined route. **The designated route is to travel south on Otter Creek Road to Consaul Street. West on Consaul Street to Wheeling Street. South on Wheeling Street to the hospital. St. Charles Hospital is on the corner of Wheeling Street and Navarre Street. See the Hospital Route Map (Figure 12.1) following this page.**

Emergency telephone numbers for the area surrounding the Site are listed on Table 12.1. Telephone service (cellular) will be provided at the Site during field activities.

Figure 12.1 and Table 12.1 will be readily available on the Site during all O&M activities.

13.0 IMPACTED MATERIAL MIGRATION CONTROL

To prevent the migration of potentially impacted material both on and off the Site, vehicle entry into the EZ will be minimized.

All vehicles and equipment used in the EZ will be decontaminated prior to leaving the Site. The HSO will supervise the decontamination of each piece of equipment prior to its removal from the Site. Personnel engaged in vehicle decontamination will wear protective equipment including disposable clothing and splash (face) shield, as necessary.

Decontamination procedures will be strictly adhered to for all personnel and equipment used in the EZ. The procedures for personnel are as follows:

1) all personnel will remove disposable outer clothing, if worn, prior to leaving the EZ;
2) disposable clothing will be placed in designated containers; and
3) personnel will wash hands and faces before eating, drinking or smoking.

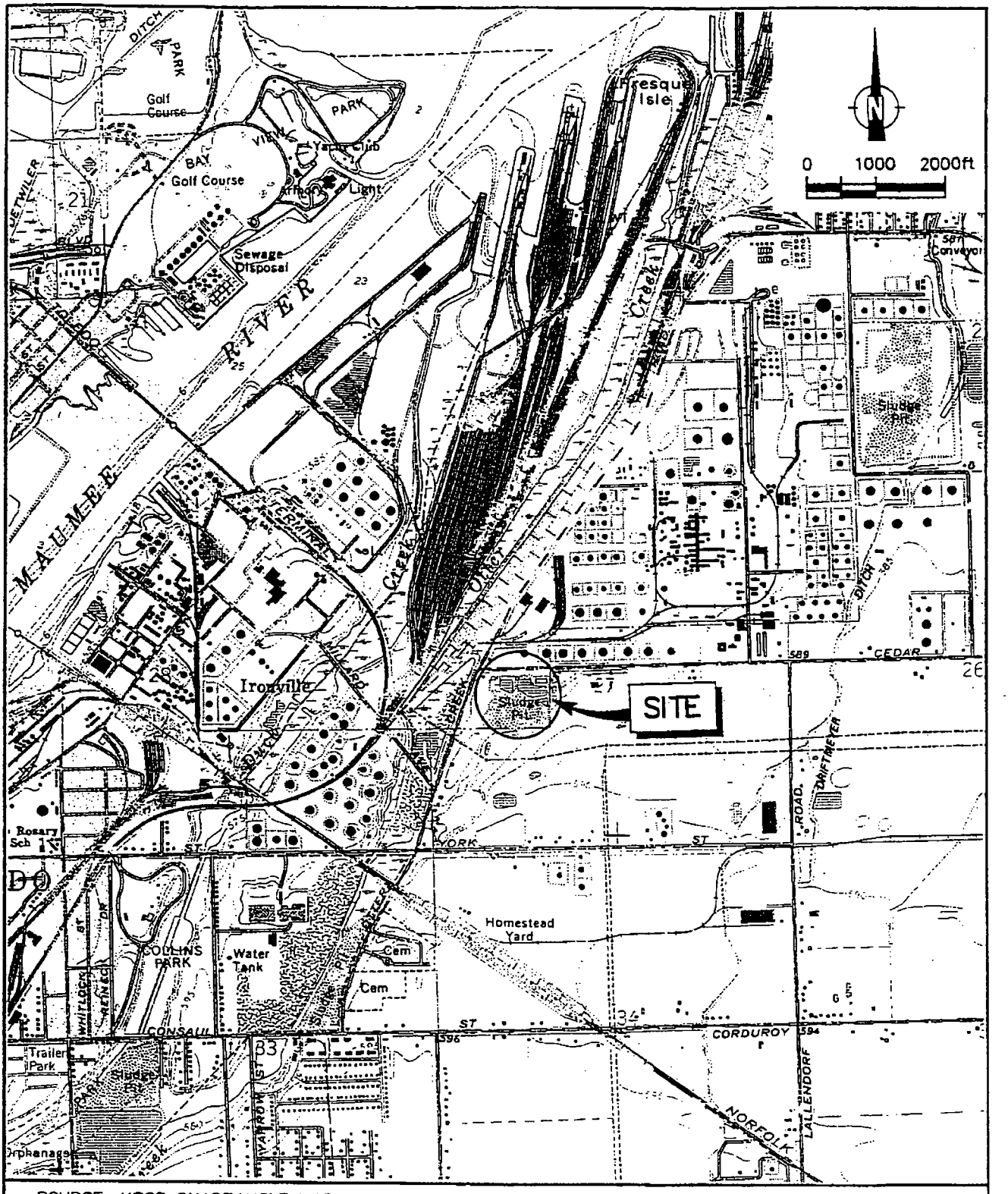
At the completion of field activities, rubber boots and potentially impacted clothing, if worn, will be disposed of appropriately.

Decontamination procedures for equipment which came in contact with potentially contaminated materials will include an Alconox (or equivalent) detergent wash using brushes and a DI or potable water rinse. Decontamination wash waters will be disposed of in the on-Site leachate collection sump.

14.0 SAFETY MEETINGS

The HSO will conduct a safety meeting with all employees prior to the initiation of operation and maintenance activities. Safety meetings will be held to brief employees on upcoming tasks and associated safety concerns/expectations, as necessary. The meetings will provide refresher training for existing equipment and protocols (if required), and will examine new Site conditions as they are encountered. Additional safety meetings will be held on an as required basis.

Should any unforeseen or peculiar safety related factor, hazard, or condition become evident during the performance of work on the Site, it will be brought to the attention of the HSO verbally as quickly as possible, for resolution. In the interim, prudent action will be taken to establish and maintain safe working conditions and to safeguard employees, the public and the environment.



SOURCE: USGS QUADRANGLE MAP
OREGON, OHIO

CRA

figure 1.1
SITE LOCATION
COMMERCIAL OIL SERVICES SITE
Oregon, Ohio

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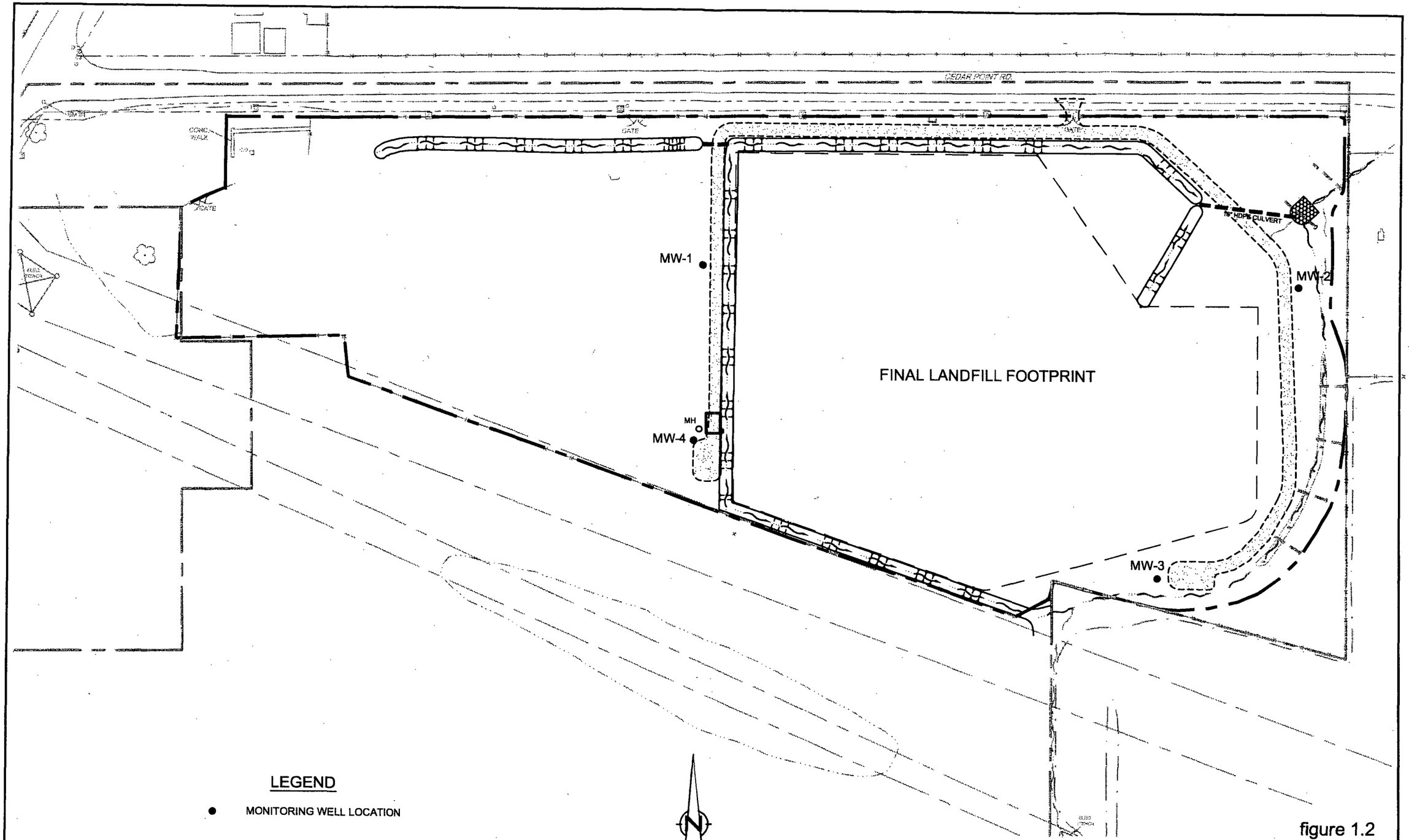

figure 1.2

EXISTING CONDITIONS
COMMERCIAL OIL SERVICES SITE
Oregon, Ohio

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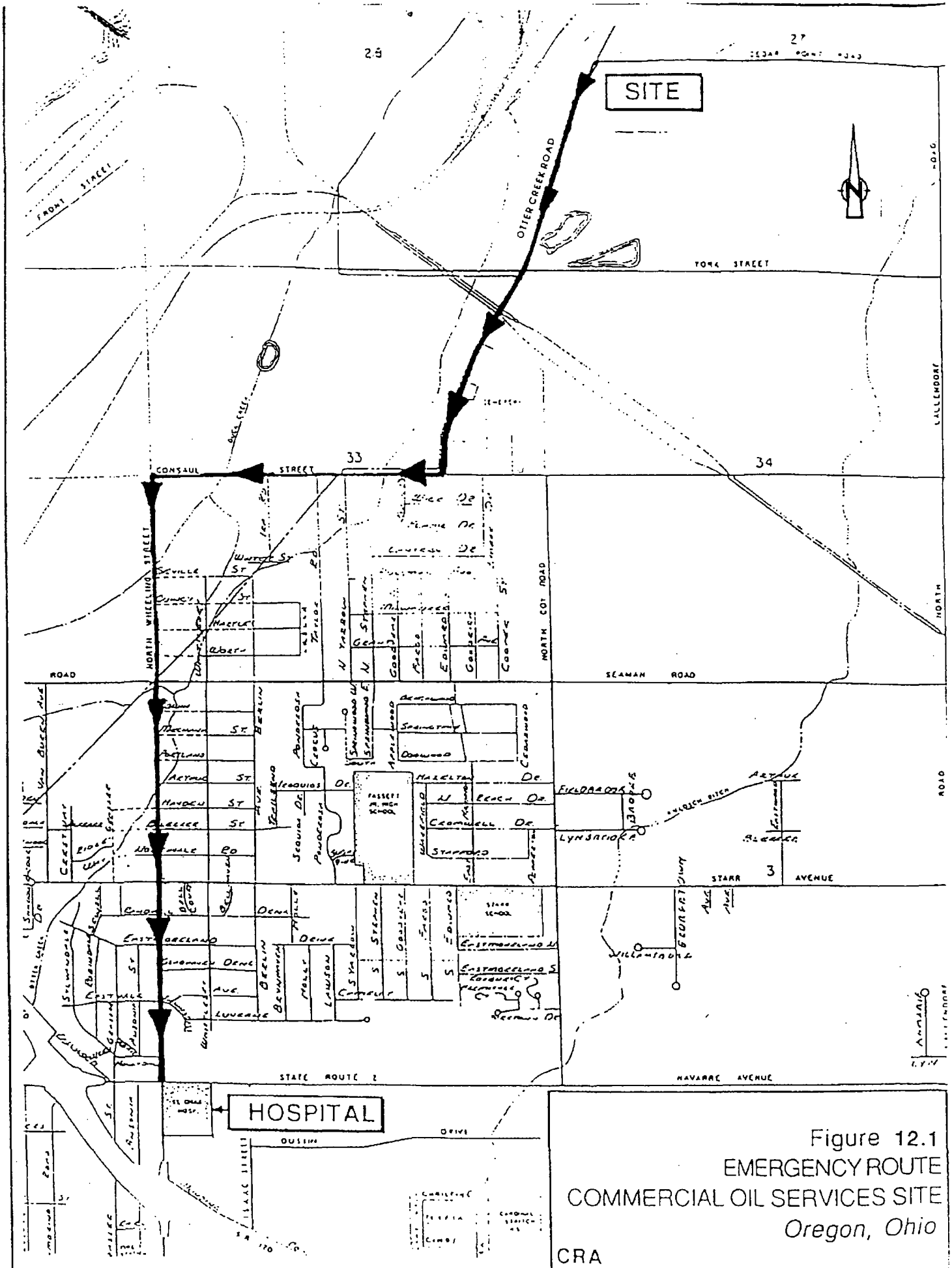

Figure 12.1
EMERGENCY ROUTE
COMMERCIAL OIL SERVICES SITE
Oregon, Ohio

CRA

TABLE 3.1

SITE HAZARD ANALYSIS
COMMERCIAL OIL SERVICES SITE
OREGON, OHIO

	Site Activities	*Hazards*	*Prevention*
1.	Leachate Monitoring/ Sampling/Removal	- Potential for skin exposure to or ingestion of impacted liquids and inhalation exposure to VOCs	- Wear appropriate PPE
		- Slip, trip, fall, lifting hazards	- Ensure good housekeeping and work procedures
2.	Groundwater Sampling	- Potential for skin contact witl impacted groundwater	- Wear appropriate PPE
		- Slip, trip, fall, lifting hazards	- Ensure good housekeeping and work procedures
3.	Site Inspection/Maintenance	- Potential for skin exposure to impacted soil	- Wear appropriate PPE
		- Slip, trip, fall, lifting hazards	- Ensure good housekeeping and work procedures
		- Powered/heavy equipment operation hazards	- Maintain awareness of obstacles and other workers and ensure good handling procedures

TABLE 12.1

EMERGENCY TELEPHONE NUMBERS
COMMERCIAL OIL SERVICES SITE
OREGON, OHIO

Agency/Organization	*Telephone Number*
St. Charles Hospital	419-698-7200 **or 911**
Ambulance	419-691-5787 **or 911**
Local Police	419-691-5787 **or 911**
Local Fire	419-691-5787 **or 911**
USEPA - Emergency Response	800-424-8802
ChemTrec - Spill Response	800-424-9300
National Response Center	800-424-8802
Underground Utility Locator	800-647-7344
USEPA OSC - Sheila Sullivan	312-886-5251
Ohio EPA RPM - Ron Nabors	419-373-3147
Engineering Management, Inc. - James Campbell	412-244-0917
Conestoga-Rovers & Associates, Inc. - Alan Van Norman	519-884-0510